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THE

MANAGEMENT OF BEES

WITH

A DESCRIPTION OF THE

LADIES' SAFETY HIVE

By SAMUEL BAGSTER, Jun.

With Forty Illustrative Wood Engravings.

LONDON:

SAMUEL BAGSTER, PATERNOSTER ROW; OR
VERE STREET, CAVENDISH SQUARE;
AND WILLIAM PICKERING, CHANCERY LANE.

DISCARDED

London: Printed by S. Bagster, Jun., 14, Bartholomew Close.

ADVERTISEMENT.

THE LADIES' SAFETY HIVE

IS A

NEW INVENTION,

AND IS CALCULATED FOR THE MANAGEMENT OF THE BEE IN THE EASIEST MANNER.

See the Preface and Chapter XIII. for full particulars.

The price is £3. 3*s.*: every part is well tongued in cement, and sound.

To those who may wish assistance in stocking S. Bagster will be accommodating, if not too far from town, on payment of actual disbursements: personal remuneration he does not seek.

These hives are kept stocked; *if ordered* in the autumn they will be delivered in spring for an additional guinea; but spring-customers must pay according to the difficulty of getting stocks at that expensive season; possibly at no increased charge, or at a very trifling increase.

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The hives may be seen at No. 6, *Vere Street, Cavendish Square;* at Messrs. R. R. CHUBB and Co.'s, *Florists*, Nos. 70 and 71, *Newgate Street;* or at the PRINTING OFFICE, No. 14, *Bartholomew Close;* or at work at the author's private residence, *Aldine Cottage, Shepherd's-Bush*—SUNDAYS excepted, in visiting, or being visited.

Those who intend to commence in the spring with ready-stocked hives, should address him a letter as early as possible in the autumn, to give the opportunity of choosing strong stocks, and settling them to stand through the winter, which will save the most valuable spring month. The winter attention of feeding, and the risk of surviving the casualties of that inclement season, he personally incurs without any extra charge.

PREFACE.

PREFATORY remarks are generally written by the literary father of a new publication, to ensure a favourable reception, whether he rank as author, editor, or compiler; and though one may condemn the practice,—another praise it as a customary tribute to public taste,—and a third cringe to his readers, hoping by such fulsome means to ensure their good feeling; all three attempt to disguise the fact, that they depend on their preface to produce a favourable effect upon the public mind, not considering that most of their readers are as acute as themselves. A courageous man needs not make a parade of his magnanimity,—he cannot be a coward; while another

> Must whistle as he goes,
> To keep his courage up.

As for myself, I do not affect to be regardless of public applause;—I write this preface to

ensure a reading to my book. It is true, I am not, strictly speaking, either author, editor, or compiler, but *tria juncta in uno*—part author, part editor, and part compiler, and as such, am not ashamed to avow that I am indebted to more heads than one in the production of this little volume.

From my earliest youth, works on natural history have been my chief reading; often while at home during my vacations, and afterwards during my apprenticeship, have I spent the saved-up shilling to run into one of the rooms of the old menagerie in Exeter 'Change, and there waited until half afraid "the man in the beef-eater's coat," as he came round, from time to time, to name the peculiarities of each beast to renewed parties, would "suit the action to the word," and send me off roughly. Every opportunity to witness collections of living specimens from that time to the present has been embraced with equal avidity. Since those boyish days, the Zoological Society have opened their gardens in the Regent's Park, and Mr. Cross has removed his animals from the dungeons in Exeter 'Change, to a commodious situation on the Surrey side of the Thames; and a taste for

the study of animated nature generally, seems to have pervaded the land.

From general study, the mind gradually concentrates its energies to one object; and I found myself most interested in Bees. During my researches into the modes of management suggested and worked by different individuals, I was struck with the disregard shewn to the habits and instincts of these insects, and the causes of failure, which might be attributed rather to *inefficient* sources of instruction than any thing else; when my attention was drawn to Mr. Nutt's hives and his *new mode* of ventilation.

I read the chief of the old authors, and having heard many of their systems made the subject of conversation, the idea struck me that a small volume, comprising a succinct account of each real or fancied improvement, with a few practical remarks, deduced from the natural history and propensities of the bee, might prevent many persons from commencing bee-keeping by imperfect methods, and thus avoid much disappointment. A clear exposition of errors generally leads to improved practice.

The translator of Huber, when he wrote his preface to the work of that indefatigable naturalist

on bees, felt as I do; for he says, "The cultivation of bees forms a branch of rural economy which may be carried to a very great extent. It is greatly to be regretted, that there is no general treatise embodying all the facts already ascertained from undoubted observations. This would form a guide to those who would enter upon it as an object of importance, because the real utility to which all animals may ultimately be converted, depends solely on an intimate acquaintance with their nature."

Where possible, an apiarian's own description of his hive has been preferred, rather than run the risk of inadvertently misrepresenting his system. I have paid little regard to dates in my work; but have endeavoured to present hives and practice in the order in which I conceive they demanded attention. Having already avowed my intention in writing this preface, I need not cloak the fact, that, by describing my Ladies' Safety Hive last, I consider it to be that which claims notice for the ease with which the following desiderata in bee-management may be embraced, viz.—cool store-room—prevention of swarming—easy method of taking honey—promotion of swarming when wished—

perfect inspection of the whole hive—protection from wet in the open air—and a method of feeding in the severest weather without exposure to cold.

By the introduction of a profusion of wood-cuts amongst the letter-press, the descriptions are rendered much clearer; and I am much indebted to my wood-engraver, Mr. D. Dodd, for his personal attention to the drawings, and the care he has manifested to present them in the most favourable point of view.

I felt it was very desirable to give a faithful portrait of the three sorts of bees, *as seen after fumigation,* that those to whom the Queen is not familiar may distinguish her at a glance; while those who wish to study the points of dissimilarity more easily may do so in the magnified specimen. To Mr. Charles M. Curtis, entomological draughtsman, my especial thanks are due for the very prompt and clever manner in which he executed the original drawings of the bees, from life, and subsequently superintended the engraving. When the coloured frontispiece is first used at a fumigation, a piece of paper should be laid over the magnified bees, to keep the eye familiar to the natural size,

which appears smaller than the original, in consequence of their juxtaposition.

The price of my volume is high, compared with the sizes of many now on sale; but if my readers will examine the elaborate colouring of the frontispiece, and count the cuts interspersed throughout the volume, they will perhaps acquit me of selfishness.

One word for myself: I follow the profession of a printer; and while my *earliest and latest hours* have been spent with my bees, or for them, my *days* are devoted to the use of the public and the acquisition of an honourable income.

One word to reviewers: should you, my worthy gentlemen, have a hankering to pull my book to pieces, do so as tenderly as you can. Honey-comb cannot be handled very roughly without spilling the honey, and few combs can be found, where the bees have been industrious, without some honey in them: but while I draw a simile favourable to myself from the produce of my hives, let me not forget that every labouring bee is an emblem of a reviewer; who, while he carries a sting, uses it only to repress ignorant prying or boisterous intrusion—and devotes

his more noble energies to the extraction of whatever is valuable in flowers—whether bee-bread to feed the young—honey to sustain full-grown population—propolis to stop out insects—or royal jelly for the production of new queens. The application I leave in the hands of the critic. I have endeavoured to make my work interesting; and if I have failed to do so, be pleased to lay the blame upon me, and not on the study.

One word for another work: in the course of my researches, I bought a volume on bees, written by Mr. Samuel Purchas, in 1657, at the end of which he has annexed Meditations, drawn from similes of the bee, taken from a multitude of olden authors, and collected by him. They are so very excellent that I have reprinted most of them, and headed each meditation with a text of Scripture. They are published in a separate volume, under the title of "Spiritual Honey from Natural Hives." As it corresponds in size with this work, the reader may bind the two together; but as it is exclusively devotional, my publishers sell them separately unless specially ordered.

A common error in most of the old authors

was a repeated introduction of political allusions. I have avoided such extraneous matter, as much from a conviction of its entire uselessness in such a work as this, as from a personal dislike I entertain to such discussions.

I now commit my work to the public ordeal, to make its own way; but I hope often to be known in one of my characters, either as a practical Typographer or devoted Apiarian, and subscribe myself as such,

SAMUEL BAGSTER, Jun.

14, *Bartholomew Close,*
London.

INDEX.

CHAPTER I.

ON THE SIMPLIFICATION OF THE PROCESS OF MANAGING BEES.

Preliminary Observations—Causes of frequent failure—Misapplied parsimony of country people—Proper food for bees—Disadvantages attendant on the old cottage system—Present and former methods of taking honey—Plan and design of this volume—Acquaintance with diffuse disquisitions not essential to practical cultivation of the science—Detracting spirit of authors with regard to their fellow-candidates for public approbation—Valuable discoveries of Mr. Nutt—General scarcity of works on bees—Invitation of the fair sex to the study—Perseverance indispensable—A record of daily practice recommended.

CHAPTER II.

NATURAL HISTORY OF THE BEE.

Extended scientific description of the queen-bee, drones, and workers—Kirby and Spence's Introduction to Entomology

—Different sorts of working bees — Curious discovery of M^lle. Jurine and consequent conjectures by various naturalists—Banishment of superannuated bees from the hive—Extraordinary exertion of instinct on the death of the queen—Selection and education of young workers to occupy the vacant throne—Enclosure of the larva in a royal cell—Different food prepared for its maintenance—Astonishing transformation resulting from this process — Experiment of Reaumur in confirmation of the fact—Period of existence in the preparatory state of the females, males, and workers—Coccoons spun by the queen different from others, and why—Habits, propensities, and functions of the queen—Instinctive enmity towards the rival queens—Remarkable fact related by Huber—The right of succession determined by single combat —Nurture of young queens for leading a swarm—Loyalty and attachment of the bees to the person of their sovereign—Different periods of oviposition—The drones, or male bees—Period of their slaughter and method of killing them—Different fate in hives containing a queen imperfectly fertile—Conjectures as to the reason of this—The working bees—Their constant activity in collecting honey, propolis, and wax—Description of the organs by which the operation is performed —Their discrimination and avoidance of poisonous flowers—Time of collecting pollen—Direct flight of bees—Method practised in New England to discover their nests—Constant and instinctive cleanliness—Their nature and economy, notwithstanding many circumstances still inexplicable, sufficiently known to attest the glory and wisdom of the Great Creator.

CHAPTER III.

COTTAGE SYSTEM EXPLAINED.

Obstinate pertinacity of rustic bee-masters in continuing their antiquated practice—Original form of hives—Directions for the selection of stocks—Methods proposed for their removal on being purchased—Rural plans for sheltering hives—Bee-houses—Disadvantages connected with their use.

CHAPTER IV.

ON THE STORIFYING SYSTEM; OR, PLACING ONE VESSEL ON ANOTHER.

Inhuman method of taking the honey formerly practised—A preferable plan by the use of a glass, explained and recommended—The eke, a temporary addition to the straw hive—Super-hiving and nadir-hiving—Increased heat the cause of swarming—Thorley's experiment—Various methods of storifying adopted by apiarians—Opinion of Keys—Advantages of the method adopted by that writer—Indications for storifying stocks—Mode of replenishing stocks—Intrusion of interlopers on the death of a queen, with its remedy—Effect of very sultry weather on the combs—Keys' bee-boxes—Improvement suggested by Dr. Bevan—Keys' dividers—Palteau's hive—Recommendation of it by Bosc—Extract from Dr. Reid.

CHAPTER V.

THE PRINCIPLES OF STORIFYING EXAMINED.

The bees a united commonwealth, each alike animated with a zeal for the public welfare—The principle of an even tem-

perature common to all storified hives—Objections to the various systems of storifying practitioners—The bees thereby inconvenienced, and the collection of honey impeded—Impurity of the honey thus obtained—Ventilation indispensable to their successful management—Observations of Swammerdam and Maraldi—Storied hives no protection against the moth—Disadvantageous effects of the stories being but partially elevated.

CHAPTER VI.

ON COLLATERAL BEE-BOXES.

Mr. White's hive—Directions as to its construction—Madame Vicat's knowledge and experience in apiarian science—Description of her hive—The hive of Gelieu—Inconvenience of the various modes, which, though certain improvements on former usage, will not compensate for additional expense—Great attention to the nature and habits of bees necessary.

CHAPTER VII.

THE HIVE OF HUISH DESCRIBED.

Courage much boasted of by bee-masters in general,—indispensable to those who use Mr. Huish's hive—Minute description of its form and management—Dr. Bevan's doubts of its practicability—Anecdote of a celebrated physician.

CHAPTER VIII.

ON SWARMS.

Disadvantage of close confinement to the bees. Section I. Causes of Swarming. Plain dictates of common sense—The heat of a hive calculable by the thermometer—Comparative temperature before and after swarming—Experiment of Huber—Clustering of bees outside a hive an indication of extreme heat—These observations confirmed by Keys and Huish. Section II. Indications of Swarming. Clustering not of itself a sufficient sign—Various others enumerated—Tumult and agitation which precede a swarm, as observed by Huber—Curious anecdote from the Abbé della Rocca—Singular circumstance mentioned by Huish—The appointment of a watch necessary to the certain observation of a swarm—Injudicious selection of children for this purpose, illustrated by an anecdote. Section III. Management of Swarms. Inoffensiveness of bees at swarming time—Division and separation of the swarm injurious to the proprietor—Slaughter occasioned by double swarms hiving together—Objects on which the swarm fastens—Method of suspension—Proper mode of hiving. Section IV. Relative value of Swarms and Casts. Numerous swarms no proof of the prosperity of an apiary—Rapidity with which comb is sometimes constructed and filled. Production of virgin honey by maiden swarms—Provident care of casts recommended. Section V. Weakening influence which swarming has upon a colony. Danger of early swarms perishing — Frequent swarming hinders the collection of honey—Number of swarms dependent on the fertility of the country, and heat of the climate—A succession of unfavourable seasons destructive to the lives of bees—Extracts from Gmelin's travels—Ditto from travels in Lapland by an officer of the Swedish army.

CHAPTER IX.

FUMIGATION.

Distinctions and differences—Fumigation not suffocation—Cruelty of the suffocating process—Greater policy as well as humanity of fumigation—Idiot bee-eater of Selborne—Honey-bird of South Africa—Curious extract from Pringle's African Sketches—Fumigation described, as practised by Thorley—Nutt's simplification of Thorley's process.

CHAPTER X.

THE OLD AND NEW METHODS OF UNIONIZING STOCKS EXPLAINED.

Disappointment frequently experienced by those who employ suffocation—System of honey-gathering prevalent in the north—The destruction of bees disapproved by Warder, in 1749—Plan for uniting casts and swarms, adopted and recommended by that apiarian—The evening the proper time for their union, and why—Extract from an old author—Huish's attempt to supply a cast with a queen—Success of the experiment—Powers of recognition possessed by bees—Pass-word of the hive—Anecdotes of Wildman, and extracts from his writings—His extraordinary feats—Ingenious contrivance for neutralizing the odours of different stocks, invented by Walond, and adopted by Dr. Bevan—The use of fumigation in stocking ventilated hives.

CHAPTER XI.

VENTILATION, A NEWLY DISCOVERED SECRET IN BEE MANAGEMENT AS AT FIRST DEVELOPED IN MR. NUTT'S HIVE, DESCRIBED.

Hasty judgment deprecated—Remarks on certain prevalent errors—The consistency of nature's laws—Natural powers of ventilation possessed by bees—Mr. Nutt's improvements—Strictures on the observations of a certain reviewer—Circumstances which led to the discoveries of Nutt—Detail of his experiments and directions.

CHAPTER XII.

THE COTTAGER'S VENTILATING HIVE.

Visit to a country bee-master—His attachment to old systems—Rural associations connected with straw hives—The general regard paid by mankind to the customs of their forefathers, exemplified by the heavy plough used in Kent—Expediency of consulting these prejudices as much as possible——The hive described—Experiments connected with the progress of its invention—Swarming superseded by this plan—Inconveniences which, notwithstanding their improvements, are inseparable from straw hives—Wooden boxes recommended as a substitute.

CHAPTER XIII.

THE LADIES' SAFETY HIVE EXAMINED AND EXPLAINED.

Circumstances which originated the invention—Simple sense and plain principles—Courage not so necessary as

judgment—Critical instance in which both were required and exercised—History of the stocking of a hive—Construction of the ladies' safety hive, and directions for its use—Comparison of these hives with others—Cottage system—Storifying system—Collateral bee-boxes—Huish's hive.

CHAPTER XIV.

GENERAL DIRECTIONS FOR THE EXTRACTION OF HONEY AND WAX.

Usual method of draining combs—A better apparatus proposed—Separation of wax from the combs—Striking instance of economic sagacity displayed by the bees—Extraction of marketable wax without pressing—Another plan, without straining or pressing—A third, by which the purest wax may be obtained without straining or the use of a precipitate.

CHAPTER I.

GENERAL OBSERVATIONS ON THE SIMPLIFICATION OF THE PROCESS OF MANAGING BEES.

WHILE every known science has its ardent admirers, it may with equal truth be said, that almost every one has also numbered some as its students, who, from a really trifling cause, or want of perseverance and the use of common sense, have abandoned the study in disgust. Take Botany, for instance: the most expensive books are purchased at once, the study is commenced with much ardour—plants are collected—hedge-rows and meadows are traversed, and occasionally a rare specimen is picked up at a sale, until eventually a *hortus siccus* begins to grow into existence. So matters go on for a year or two; an illness perhaps intervenes, or a change of locality from the country to a city for a short time, and, without knowing how, the student lets slip his rudiments—his hortus siccus gets dry indeed, and some of the specimens are damaged, others are lost; and thus, one who has promised well, gives up all in despair. Why is it? *He has attempted too much.* Let him have taken up the study with less

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ardour and more perseverance, one difficulty after another would have vanished; and who can tell but the literary world might have been favoured with some few of his discoveries?

Such remarks as the foregoing apply, in a very strong degree, to the study we have before us. How many deserted bee-houses and bee-hives stand as monuments of the truth of these remarks in rich men's gardens—and the apologies for bee-houses in the gardens of those whose rent might easily have been paid from the labours of their industrious little tenants, if the commonest degree of common sense had been allowed to operate. Most people know that when they are hungry they must have something to eat; but they judge otherwise of their poor bees: for if one of the strong winter stocks, *under the old cottage plan*, is left to itself in a rich honey country, it will, in the course of May, June, July, and sometimes in August, throw off its superabundant population, to seek store-room away from the hive; thus it is plain, that the *swarm* in June must have more time to establish itself than the *cast* thrown off in July, and so the July cast than that of August; and yet so regardless of their interest are many people in this matter, that sooner than give the latest weak stocks a little food,* they will allow

* The best food for bees is a little stale honey, which may be purchased at a very low rate; and the more plentifully a hive is supplied *after August* is closed, the more abundant will be the new honey which the bees will repay to you next spring. Use them handsomely, and they will not be ungrateful.

them all to starve with hunger. Bees can bear cold, however intense, if they have food.

In a subsequent part of this work, the mode of saving the lives of weak stocks is treated upon in full.

The obvious question when you go to the bee-houses of those who keep up the old cottage system, is, "How do your bees get on?" But instead of a clear answer, your friend replies, "I really cannot tell; last year I took up the swarms and casts, but they gave me next to nothing: I got 2lbs. from one hive—none from another—one of the June swarms gave me as much as 16lbs., and in all, I believe, pan included, it's true, the weight might be 58lbs. in 7 hives; but this year I have tried my *luck* on the winter, and if it proves fine I shall be all right. The old stocks were all full—I took them all but one, so that *if* the poor hives do die, why I can begin again by swarming from that one." So your friend manages his bees as though they were not under any of the rules of the God of nature, and rests on chance—sheer luck, as he calls it.

In this matter a little common sense would have saved him trouble and loss: if he could have managed, on his system, to have given them *cool* room, they would not have swarmed; but this he did not do. He was therefore subjected to a double loss.—First, The bees, while the eggs are hatching, supply large quantities of food for the larvæ, and as they do not collect honey and bee bread at the same time, the collection of the sweets is retarded.

Secondly, If, instead of taking all the swarms, he had chosen some of the *strongest* swarms and some of the *stalest* old stocks, which wanted renewing, to get rid of the vermin that accumulate in the old straw hives, he would have had virgin honey and comb produced from the swarms for his own eating, and the honey of the *old* hive might be given to the weak casts, which would keep them in heart until spring. When spring arrived, the cause or necessity of swarming would not be experienced by them, because there would be plenty of room to construct comb and store honey.

And again, if, instead of priding himself on the chances of good luck if the winter were not cold, he had placed his bees in a northern aspect, sheltered from the south, to keep them as torpid as possible, he might have calculated upon *strong*, though small stocks, to begin the summer; and which would collect more honey than a swarming old stock. Warm winters make sad havoc among poor stocks of bees, and rich ones have sometimes nearly empty combs with which to begin the new year.

Much misinformation has been communicated on the subject of taking bees, which has tended more to darken than illuminate this intricate matter. Supposing the old system pursued, the deadly brimstone soon kills the bees, and discolours the honey, although of course there is no fear of personal inconvenience; but with those who work glasses much timidity is manifested. Lest the bees should sting the operator

a bees' dress is provided, and with some a system of tobacco or burnt brown paper fumigation is practised to keep off the bees; and a wonderful display of courage is required to perform the commonest operation. Even here "common sense" is rather useful: if the operator wants to take a full hive glass, and replace it with an empty one, let him *gently* raise the glass from the adhesive propolis which has fastened the glass down, by means of a strong-backed table-knife; *the less it is raised the better*: then, with a piece of what is termed *soft* small copper wire, passed under the edge of the glass, *gently* cut through the comb: the full glass is thus free. Have the empty one at your right hand, close by; then with a soft tea-napkin in your right, and your left hand on the knob of the full glass, turn it over *gently*, but with a dexterous sleight of hand, covering its mouth with a cloth; the right hand is thus at liberty to cover the newly exposed hole on the hive with the empty glass. You then carry the glass to another part of the garden, in the shade, for an hour or two; and, when within two hours of dark, bring it to the front of the hive to which the bees belong, and place it on its side on a stool, and take care to prevent its rolling; and the buzz of the hive will draw the inhabitants of the glass across to their queen. Steady, unflinching gentleness, and little talking,

if there are lookers on, the better. With many, this is a long operation, which so irritates the bees that their stings get into play.

Now, the object of this little volume is to simplify the process of bee management, by pointing out the character of the little favourites, the different modes which have been put into practice to govern them—to show how far their natural instincts may be made subservient to their artificial culture, and that attention to certain results is the only true method of obtaining perfection. Huish says, "Without previous instruction, or consulting the most esteemed authors on the subject, I would not advise any one to commence apiarian; and it is in acting contrary to this advice, that the culture of the bees has declined: for of what use is it to multiply the number of bee-proprietors, and for these persons, at a considerable expence, to augment the number of their hives, if, from an ignorance in their management, without a knowledge of their wants, or the accidents to which they are liable, and the method of remedying them, a great part of the hives die in the winter?" Most works on the subject have elaborate disquisitions on the vivification of the eggs—the time when it takes place—the use of the drones—the duration of the lives of bees—and many other points, which, to the *practical* apiarian, are as useless as a learned disquisition on the process of mastication would be to a hungry man. *Don't attempt too much.* Let the practical

use of these valuable insects become known, and there will soon be found an abundance of individuals who will devote their entomological talents to the elucidation of some of these great and unsolved problems. It is enough for us to know that the fecundity of the queen is almost beyond belief, and that the God of nature has endowed bees with such wonderful instinct, that if she becomes barren they destroy her, and produce a second ;* so that, without going into the question of how and when it is effected, the practical apiarian may rely on a full, nay, an enormous increase of labourers.

Much hypercriticism has been exercised by those who have written on this subject, and an evident attempt has been made by each candidate for public favour to decry those who have preceded him, and who, most probably, at a greater personal sacrifice and risk of property than himself have educed those great principles on which he is founding his new acquirements. The author is, therefore, anxious at once to render *his* meed of praise to the indefatigable Mr. Nutt, whose exertions in this study have been the means of dispelling much of the misunderstanding which has so long prevailed : by his endeavours a great degree of common practical light has been thrown on the management of bees; and if they could express their thanks in words, no doubt they would tell us many a funeral dirge has been spared by his humane mode of management. To Mr.

* For further particulars see Chapter II.

Nutt's instructions and hives the author is *wholly* indebted for the application of theories which had long occupied his mind, and the disabusing of antiquated notions of really long standing: he therefore intends to lay before the public a plain system of practical experience, without loading his book with unnecessary theories or drier disquisitions. His motto shall be, "Let every tub stand on its own bottom."

On enquiry, very few even second-hand copies of former authors' works are on sale, while Mr. Nutt's* work is the only *new* book, besides one by Dr. Bevan, chiefly urging the storifying system, which, being almost exclusively devoted to the developement of favourite plans, are not so useful to a person who wishes to know *all* that has been done as one which gives a concise account of each improvement. The author disclaims the most remote intention of hindering any other candidates for public favour from holding the rank in bee management they deserve; and hopes that his attempt to apply the invaluable

* This book is entitled, "Humanity to Honey Bees: or, Practical Directions for the Management of Honey Bees upon an improved and humane plan, by which the lives of bees may be preserved, and abundance of honey of a superior quality may be obtained;" and is printed for the author by H. and I. Leach, Wisbeach, and may be purchased at his own house, at Moulton Chapel, Lincolnshire; of Mr. Neighbour, 131, High Holborn, London, who is agent for the sale of his hives; also by the publisher of this volume; and of Messrs. Longman and Co., Paternoster Row. Price 12s. in cloth bds.

discoveries of Mr. Nutt* to cottage practice, may not be considered as intended to disparage Mr. Nutt in the estimation of his friends: on the contrary, he, with much pleasure, states that he has two of Mr. Nutt's hives* now working under the most flattering and delightful circumstances; and which he will fully explain to any individual who has not the opportunity of the more lucid instruction of the worthy man himself. The larger hive,* invented by the writer of these pages, is intended for the use of ladies, and is suited to second-rate bee-gathering localities, equally with the most abundant pasturage.

Before closing this chapter, the author desires to invite ladies to the study, on his assurance that they need not fear either a sting or ingratitude: their attention will be appreciated by the sagacious little fellows; and, from past observation, the author believes they will recognise the person of their patron. The system is easy; and he hopes that those who enter perseveringly into the question will keep a diary of principal events, with results, and remit them to him, and proper use shall be made of them in a second edition, if one be called for: authors should always remember this. Should he have erred, he will be thankful to have the error communicated to him, and he will take the earliest opportunity of acknowledging it.

* The hives named above are treated of more fully in another part of this work.

CHAPTER II.

NATURAL HISTORY OF THE BEE.

Bees work for man; and yet they never bruise
Their master's flower, but leave it, having done,
As fair as ever, and as fit for use:
So both the flower doth stay, and honey run.
All things that are, though they have several ways,
Yet in their being join with one advice
To honour God: and so I give thee praise.
But who hath praise enough? Nay, who hath any?
None can express thy works, but he that knows them.

Herbert.

As every reader is not aware of the differences of form that distinguish the queen, drones, and workers from each other, a technical description is here given, which will be more fully seen by reference to the Frontispiece. "The body of the female bee or queen is considerably longer than that of either the drone or the worker. The prevailing colour in all three is the same, black or black-brown; but with respect to the female this does not appear to be invariably the case. Reaumur affirms, after describing some differences of colour in different individuals of this sex, that a queen may always be

distinguished, both from the workers and males, by the colour of her body. If this observation be restricted to the colour of some parts of her body, it is correct; but it will not apply to all generally; (unless, as I suspect may be the case, by the term body he means the abdomen;) for, in all that I have had an opportunity of examining, the prevailing colour, as I have stated it, is the same.

The *head* is not larger than that of the workers; but the *tongue* is shorter and more slender, with straighter *maxillæ*. The *mandibles* are forficate, and do not jut out like theirs into a prominent angle; they are of the colour of pitch with a red tinge, and terminate in two teeth, the exterior being acute, and the interior blunt or truncated. The *labrum* or upper-lip is fulvous; and the *antennæ* are piceous.

In the *trunk*, the *tegulæ* or scales that defend the base of the wings are rufo-piceous. The *wings* reach only to the tip of the third abdominal segment. The *tarsi* and the apex of the *tibiæ* are rufo-fulvous. The posterior *tibiæ* are plane above and covered with short adpressed hairs, having neither the *corbicula*, (or marginal fringe of hairs for carrying the masses of pollen,) nor the *pecten;* and the posterior *plantæ* have neither the brush formed of hairs set in striæ, nor the auricle at the base.

The *abdomen* is considerably longer than the head and trunk taken together, receding from the trunk, elongato-conical, and rather sharp at the

anus. The *dorsal* segments are fulvous at the tip; covered with very short, pallid, and in certain lengths, shining, adpressed hairs; the first segment being very short, and covered with longer hairs. The *ventral* segments, except the *anal*, which is black, are fulvescent or rufo-fulvous, and covered with soft longer hairs. The *vagina* of the *spicula* (commonly called the sting) is curved.

The *male* bee, or dronę, is quite the reverse of his royal paramour; his body being thick, short, and clumsy, and very obtuse at each extremity. It is covered also, as to the *head* and *trunk*, with dense hairs.

The *head* is depressed and orbicular. The *tongue* is shorter and more slender than that of the female; and the *mandibles*, though nearly of the same shape, are smaller. The *eyes* are very large, meeting at the back part of the head. In the space between them are placed the *antennæ* and *stemmata*. The former consist of fourteen joints, including the *radicle*, the fourth and fifth being very short and not easily distinguished.

The *trunk* is large. The *wings* are longer than the body. The *legs* are short and slender. The *posterior tibiæ* are long, club-shaped, and covered with inconspicuous hairs. The *posterior plantæ* are furnished underneath with thick-set *scopulæ*, which they use to brush their bodies.

The *claw-joints* are fulvescent.

The *abdomen* is cordate, very short, being scarcely

so long as the head and trunk together, consisting of seven segments, which are fulvous at their apex. The first segment is longer than any of the succeeding ones, and covered above with rather long hairs. The second and third dorsal segments are apparently naked; but under a triple lens, in a certain light, some adpressed hairs may be perceived;—the remaining ones are hairy, the three last being inflexed. The ventral segments are very narrow, hairy, and fulvous.

The *body* of the *workers* is oblong.

The *head* triangular. The *mandibles* are prominent, so as to terminate the head in an angle, toothless and forcipate. The *tongue* and *maxillæ* are long and incurved: the *labrum* and *antennæ* black.

In the *trunk* the *tegulæ* are black. The *wings* extend only to the apex of the fourth segment of the abdomen. The *legs* are all black, with the *digits* only rather piceous. The posterior *tibiæ* are naked above, exteriorly longitudinally concave, and interiorly longitudinally convex; furnished with lateral and recumbent hairs to form the *corbicula*, and armed at the end with the *pecten*. The upper surface of the *posterior plantæ* resembles that of the *tibiæ;* underneath they are furnished with a *scopula*, or brush of stiff hairs set in rows: at the base they are armed with stiff bristles, and exteriorly with an acute appendage, or *auricle*.

The *abdomen* is a little longer than the head and trunk together; oblong, and rather heart-shaped—

a transverse section of it is triangular. It is covered with longish flavo-pallid hairs: the first segment is short with longer hairs; the base of the three intermediate segments is covered, and as it were, banded, with pale hairs. The apex of the three intermediate ventral segments is rather fulvescent, and their base is distinguished on each side by a trapeziform *wax-pocket* covered by a thin membrane. The sting, or rather *vagina*, of the *spicula* is straight."

This description has been extracted from the "Introduction to Entomology, by the Rev. W. Kirby and W. Spence, Esq.," where a very extended discussion may be perused on all the difficult points in the natural history of the bee, and written in a manner which cannot fail to captivate even a cursory reader. These delightful writers have extracted from two authors, Messrs. Reaumur and the elder Huber, and given other observations to elucidate the history from which the following has been abridged:—

"The society of a hive of bees, besides the young brood, consists of one female or queen, several hundreds of males or drones, and many thousand workers.

The *female*, or queen, first demands our attention.

There are two descriptions of males—one not bigger than the workers, supposed to be produced from a male egg laid in a worker's cell. The common males are much larger, and will counterpoise two workers.

There are also two sorts of workers, the wax-makers and nurses. They may also be further divided into fertile and sterile: for some of them, which in their infancy are supposed to have partaken of some portion of the royal jelly, lay male eggs. There is found in some hives, according to Huber, a kind of bees, which from having less down upon the head and thorax appear blacker than others, by whom they are always expelled from the hive, and often killed. Perfect ovaries, upon dissection, were discovered in these bees, though not furnished with eggs. This discovery induced M^lle. Jurine, the lady who dissected them, to examine the common workers in the same way; and she found in all that she examined, what had escaped Swammerdam, perfect though sterile ovaries. It is worth inquiry, though Mr. Huber gives no hint of this kind, whether these were not in fact superannuated bees, that could no longer take part in the labours of the hive. Thorley remarks, which confirms this idea, that, if you closely observe a hive of bees in July, you may perceive many amongst them of a dark colour, with wings rent and torn; but that in September not one of them is to be seen. Huber does not say whether the wings of the bees in question were lacerated; but in superannuated insects the hair is often rubbed off their body, which gives them a darker hue than that of more recent individuals of the same species. Should this conjecture turn out true, their banishment and destruction of the seniors of the hive

would certainly not show our little creatures in a very amiable point of view. Yet it seems the law of their nature to rid their community of all supernumerary and useless members, as it is evident from their destruction of the drones after their work is done.

A most extraordinary circumstance in their history, which is supported by evidence that seems almost incontrovertible, is, that if the bees are deprived of their queen, and are supplied with comb containing young worker brood only, they will select one or more to be educated as queens; which, by having a royal cell erected for their habitation, and being fed with royal jelly for not more than two days, when they emerge from their pupa state (though, if they had remained in the cells which they originally inhabited, they would have turned out workers) will come forth complete queens, with their form, instincts, and powers of generation entirely different. In order to produce this effect the grub must not be more than three days old; and this is the age at which, according to Schirach, (the first apiarist who called the public attention to this miracle of nature,) the bees usually elect the larvæ to be royally educated; though it appears from Huber's observations, that a larva two days or even twenty-four hours old will do. Their mode of proceeding is described to be as follows:—Having chosen a grub, they remove the inhabitants and their food from two of the cells which join that

in which it resides; they next take down the partitions which separate these three cells; and, leaving the bottoms untouched, raise round the selected worm a cylindrical tube, which follows the horizontal direction of the other cells: but since at the close of the third day of its life its habitation must assume a different form and direction, they gnaw away the cells below it, and sacrifice without pity the grubs they contain, using the wax of which they were formed to construct a new pyramidal tube, which they join at right angles to the horizontal one, the diameter of the former diminishing insensibly from its base to its mouth. During the two days which the grub inhabits this cell, like the common royal cells now become vertical, a bee may always be observed with its head plunged into it; and when one quits it another takes its place. These bees keep lengthening the cell as the worm grows older, and duly supply it with food, which they place before its mouth, and round its body. The animal, which can only move in a spiral direction, keeps incessantly turning to take jelly deposited before it; and thus slowly working downwards, arrives insensibly near the orifice of the cell, just at the time that it is ready to assume the pupa; when, as before described, the workers shut up its cradle with an appropriate covering.

When you have read this account, I fear, with the celebrated John Hunter, you will not be very ready to believe it, at least you will call upon me

to bring forth my 'strong reasons' in support of it. What !—you will exclaim—can a larger and warmer house (for the royal cells are affirmed to enjoy a higher temperature than those of the other bees), a different and more pungent kind of food, and a vertical instead of a horizontal posture, in the first place, give a bee a differently shaped tongue and mandibles; render the surface of its posterior tibiæ flat instead of concave; deprive them of the fringe of hairs that forms the basket for carrying the masses of pollen; of the auricle and pecten which enable the workers to use these tibiæ as pincers; of the brush that lines the inside of their plantæ? Can they lengthen its abdomen; alter its colour and clothing; give a curve to its sting; deprive it of its wax-pockets, and of the vessels for secreting that substance; and render its ovaries more conspicuous, and capable of yielding female as well as male eggs? Can, in the next place, the seemingly trivial circumstances just enumerated altogether alter the instinct of these creatures? Can they give to one description of animals address and industry; and to the other astonishing fecundity? Can we conceive them to change the very passions, tempers, and manners? That the very same fœtus, if fed with more pungent food, in a higher temperature and in a vertical position, shall become a female destined to enjoy love, to burn with jealousy and anger, to be incited with vengeance, and to pass her time without labour—that this very same

fœtus, if fed with more simple food, in a lower temperature, in a more confined and horizontal habitation, shall come forth a worker zealous for the good of the community, a defender of the public rights, enjoying an immunity from the stimulus of sexual appetite and the pains of parturition—laborious, industrious, patient, ingenious, skilful—incessantly engaged in the nurture of the young; in collecting honey and pollen; in elaborating wax; in constructing cells, and the like!—paying the most respectful and assiduous attention to objects which, had its ovaries been developed, it would have hated, and pursued with the most vindictive fury till it had destroyed them! Further, that these factitious queens (I mean those that the bees elect from amongst worker brood, and educate to supply the place of a lost one, in the manner just described) shall differ remarkably from the natural queens, (or those that have been wholly educated in a royal cell,) in being altogether mute.—All this you will think, at first sight, so improbable, and next to impossible, that you will require the strongest and most irrefragable evidence before you will believe it.

In spite of all these powerful probabilities to the contrary, this astonishing and seemingly incredible fact rests upon strong foundations, and is established by experiments made at different times, by different persons of the highest credit, in different parts of Europe.

Bonner, a British apiarist, asserts that he has had

successful recourse to the Lusatian experiment; and Mr. Payne, of Shipdam in Norfolk (who for many years has been engaged in the culture of bees, and has paid particular attention to their proceedings), relates that he well remembers that the bees of one of his hives, which he discovered had lost their queen, were engaged in erecting some royal cells upon the ruins of some of the common ones. He also informs me that he has found Huber's statements, as far as he has had an opportunity of verifying them, perfectly accurate.

Reaumur, to ascertain whether the expectation of a queen was sufficient to keep alive the instinct and industry of the worker-bees, placed in a glazed hive some royal cells containing both grubs and pupæ, and then introduced about 1000 or 1500 workers and some drones. These workers, which had been deprived of their queen, at first destroyed some of the grubs in these cells; but they clustered around two that were covered in, as if to impart warmth to the pupæ they contained; and on the following day they began to work upon the portions of comb with which he had supplied them, in order to fix and lengthen them. For two or three days the work went on very leisurely, but afterwards their labours assumed their usual character of indefatigable industry. There is no difficulty, therefore, when a hive loses its sovereign, to supply the bees with an object that will interest them, and keep their works in progress.

Sixteen days is the time assigned to a *queen* for her existence in her preparatory states, before she is ready to emerge from her cell. Three she remains in the egg; when hatched she continues feeding five more; when covered in she begins to spin her cocoon, which occupies another day: as if exhausted by this labour, she now remains perfectly still for two days and sixteen hours; and then assumes the pupa, in which state she remains exactly four days and eight hours—making in all the period I have just named. A longer time, by four days, is required to bring the *workers* to perfection; their preparatory states occupying twenty days, and those of the *male* even twenty-four. The former consumes half a day more than the queen in spinning its cocoon,—a circumstance most probably occasioned by a singular difference in the structure and dimensions of this envelope, which I shall explain to you presently. Thus you see that the peculiar circumstances which change the form and functions of the bee, accelerate its appearance as a perfect insect; and that by choosing a grub three days old, when the bees want a queen, they actually gain six days; for in this case she is ready to come forth in ten days, instead of sixteen, which would be required, was a recently laid egg fixed upon.

The larvæ of bees, though without feet, are not altogether without motion. They advance from their first station at the bottom of the cell, as I before hinted, in a spiral direction. This movement,

for the first three days, is so slow as to be scarcely perceptible; but after this it is more easily discerned. The animal now makes two entire revolutions in about an hour and three quarters; and when the period of its metamorphosis arrives, it is scarcely more than two lines from the mouth of the cell. Its attitude, which is always the same, is a strong curve. This occasions the inhabitant of a horizontal cell to be always perpendicular to the horizon, and that of a vertical one to be parallel with it.

A most remarkable difference, as I lately observed, takes place in spinning their cocoons,—the grubs of workers and drones spinning complete cocoons, while those that are spun by the females are incomplete, or opening at the lower end, and covering only the head and trunk and the first segment of the abdomen. This variation is probably occasioned by the different forms of the cells; for, if a female larva be placed in a worker's cell, it will spin a complete cocoon; and, *vice versâ*, if a worker larva be placed in a royal cell its cocoon will be incomplete. No provision of the Great Author of nature is in vain. In the present instance, the fact which we are considering is of great importance to the bees; for, were the females wholly covered by the thick texture of a cocoon, their destruction by their rival competitors for the throne could not so readily be accomplished; they either would not be able to reach them with their stings, or the stings might be detained by their

barbs in the meshes of the cocoon, so that they would not be able to disengage them. On the use of this instinctive and murderous hatred of their rivals I shall soon enlarge.

When our young prisoners are ready to emerge, they do not, like the ants, require the assistance of the workers, but themselves eat through the cocoon and the cell that encloses it. By a wise provision, which prevents the injury or destruction of a cell, they generally make their way through the cover or lid with which the workers had shut it up; though sometimes, but not often, a female will break through the side of her prison.

Section I.—The Female, or Queen Bee.

The *queen-mother* here demands our first attention, as the personage upon whom, when established in her regal dignity, the welfare and happiness of the apiarian community altogether depend. The first moments of her life, prior to her election to lead a swarm or fill a vacant throne, are moments of the greatest uneasiness and vexation, if not of extreme peril, and vindictive and mortal warfare. The Homeric maxim, that 'the government of many is not good,' is fully adopted and rigorously adhered to in these societies. The jealous Semiramis of the hive will bear no rival near her throne. There are usually not less than sixteen, and sometimes not less than twenty, royal cells in the same nest; you may therefore conceive what a sacrifice is made

when one only is suffered to live and to reign. But here a distinction obtains which should not be overlooked: in some instances a single queen only is wanted to govern her native hive; in others several are necessary to lead the swarms. In the first case inevitable death is the lot of all but one; in the other, as many as are wanted are preserved from destruction by the precautions taken on that occasion, under the direction of an all-wise Providence, by the workers:—there is that instinctive jealousy in a queen bee, that no sooner does she discover the existence of another in the hive, than she is put into a state of the most extreme agitation, and is not easy until she has attacked and destroyed her.

The queen that is first liberated from her confinement, and has assumed the perfect or imago state (it is to be supposed that the author is here speaking of a hive which has lost the old queen), soon after this event goes to visit the royal cells that are still inhabited. She darts with fury upon the first with which she meets; by means of her jaws she gnaws a hole large enough to introduce the end of her abdomen, and with her sting, before the included female is in a condition to defend herself or resist her attack, she gives her a mortal wound. The workers, who remain passive spectators of this assassination, after she quits the victim of her jealousy, enlarge the breach that she has made, and drag forth the carcase of a queen just emerged from the thin membrane that envelops the pupa. If the

object of her attack be still in the pupa state, she is stimulated by a less violent degree of rage, and contents herself with making a breach in the cell: when this happens, the death of the enclosed insect is equally certain, for the workers enlarge the breach, pull it out, and it perishes. If it happens, as it sometimes does, that two queens are disclosed at the same time, the care of the Almighty to prevent the hive from being wholly despoiled of a governor is singularly manifested by a remarkable trait in their instinct, which, when mutual destruction seems inevitable, makes them separate from each other as if panic-struck. 'Two young queens,' says M. Huber, 'left their cells one day, almost at the same moment;—as soon as they came within sight, they darted upon each other, as if inflamed by the most ungovernable anger, and placed themselves in such an attitude, that the antennæ of each were held by the jaws of its antagonist; head was opposed to head, trunk to trunk, abdomen to abdomen; and they had only to bend the extremity of the latter, and they would have fallen reciprocal victims to each other's sting.' But that these duels should not be fatal to both combatants, as soon as they were thus circumstanced a panic fear seemed to strike them, and they disengaged themselves, and each fled away. After a few minutes were expired, the attack was renewed in a similar manner with the same issue; till at last one suddenly seizing the other

by her wing, mounted upon her and inflicted a mortal wound.

The combats I have here described to you took place between virgin queens; but M. Huber found that those which had been impregnated were actuated by the same animosity, and attacked royal cells with a fury equally destructive. When another fertile queen had been introduced into this hive, a singular scene ensued, which proves how well aware the workers are that they cannot prosper with two sovereigns. Soon after she was introduced a circle of bees was formed round the stranger, not to compliment her on her arrival, or pay her the usual homage, but to confine her, and prevent her escape; for they insensibly agglomerated themselves in such numbers round her, and hemmed her in so closely, that in about a minute she was completely a prisoner. While this was transacting, what was equally remarkable, other workers assembled in clusters round the legitimate queen, and impeded all her motions; so that soon she was not more at liberty than the intruder. It seemed as if the bees foresaw the combat that was to ensue between the two rivals, and were impatient for the event; for they only confined them when they appeared to avoid each other. To witness the homage, respect, and love that they usually manifest to their lawful ruler; the anxiety concerning her which they often exhibit; and the distrust which for a time (as we shall see

hereafter) they show towards strange ones even when deprived of their own; one would expect that, rather than permit such a perilous combat, they would unite in the defence of their sovereign, and cause the interloper to perish under the stroke of their fatal stings. But no; the contest for empire must be between the rival candidates; no worker must interfere in any other way than that which I have described; no contending armies must fight the battles of their sovereigns, for the law of succession seems to be '*detur fortiori*.' But to return to my narrative. The legitimate queen appearing inclined to move towards that part of the comb on which her rival was stationed, the bees immediately began to retire from the space that intervened between them, so that there was soon a clear arena for combat. When they could discern each other, the rightful queen rushing furiously upon the pretender, seized her with her jaws near the root of the wings, and, after fixing her without power of motion against the comb, with one stroke of her sting dispatched her. If ever-so-many queens are introduced into a hive, all but one will perish, and that one will have won the throne by her own unassisted valour and strength. Sometimes a strange queen attempts of herself to enter a hive: in this case the workers, who are upon the watch and who examine every thing that presents itself, immediately seize her with their jaws by the legs or wings, and hem her in so straitly with a clustered circle of guards, turning

their heads on all sides towards her, that it is impossible for her to penetrate within. If they detain her prisoner too long, she dies either from the want of food or air, but never from their stings.

Here you may perhaps feel curious to know, supposing the reigning queen to die or be killed, and the bees to have discovered their loss, whether they would then receive a foreigner that offers herself to them, or who is introduced amongst them. Reaumur says they would do this immediately; but Huber, who had better means of observing them, and studied them with more undivided attention, affirms that this will not be the case unless twenty-four hours have elapsed since the death of the old queen. Previously to this period, as if they were absorbed by grief at their calamity, or indulged a fond hope of her revival, an intruder would be treated exactly as I have described. But when the period just mentioned is passed, they will receive any queen that is presented to them with the customary homage, and she may occupy the vacant throne.

I must now beg you to attend to what takes place in the second case that I mentioned, where queens are wanted to lead forth swarms. Here you will, with reason, suppose that nature has instilled some instinct into the bees, by which these necessary individuals are rescued from the fury of the reigning sovereign.

Did the old queen of the hive remain in it till the young ones were ready to come forth, her instinctive

jealousy would lead her to attack them all as successively produced; and being so much older and stronger, the probability is that she would destroy them; in which case there could be no swarms, and the race would perish. But this is wisely prevented by a circumstance which invariably takes place—that the first swarm is conducted by this queen, and not by a newly disclosed one, as Reaumur and others have supposed. Previously to her departure, after her great laying of male eggs in the month of May, she oviposits in the royal cells when about three or four lines in length, which the workers have in the mean time constructed. These, however, are not all furnished in one day,—a most essential provision, in consequence of which the queens come forth successively, in order to lead successive swarms. There is something singular in the manner in which the workers treat the young queens that are to lead the swarms. After the cells are covered in, one of their first employments is to remove here and there a portion of the wax from their surface, so as to render it unequal; and immediately before the last metamorphosis takes place, the walls are so thin that all the motions of the inclosed pupa are perceptible through them. On the seventh day the part covering the head and trunk of the young female, if I may so speak, is almost entirely unwaxed. This operation of the bees facilitates her exit, and probably renders the evaporation of the superabundant fluids of the body of the pupa more easy.

You will conclude, perhaps, when all things are thus prepared for the coming forth of the inclosed female, that she will quit her cell at the regular period, which is seven days;—but you would be mistaken. Were she indeed permitted to pursue her own inclinations, this would be the case; but here the bees show how much they are guided in their instinct by circumstances and the wants of their society; for did the new queen leave her cell, she would immediately attack and destroy those in the other cells; a proceeding which they permit, as I have before stated, when they only want a successor to a defunct or a lost sovereign. As soon therefore as the workers perceive—which the transparency of the cell permits them to do—that the young queen has cut circularly through her cocoon, they immediately solder the cleft up with some particles of wax, and so keep her a prisoner against her will. Upon this, as if to complain of such treatment, she emits a distinct sound, which excites no pity in the breasts of her subjects, who detain her a prisoner two days longer than nature has assigned for her confinement. In the interim, she sometimes thrusts her tongue through the cleft she has made, drawing it in and out till she is noticed by the workers, to make them understand that she is in want of food. Upon perceiving this they give her honey, till her hunger being satisfied she draws her tongue back—upon which they stop the orifice with wax.

You may think it perhaps extraordinary that the

workers should thus endeavour to retard the appearance of their young females beyond its natural limit; but when I explain to you the reason for this seeming incongruity of instinct, you will adore the wisdom that implanted it. Were a queen permitted to leave her cell as soon as the natural term for it arrived, it would require some time to fit her for flight, and to lead forth a swarm; during which interval a troublesome task would be imposed upon the workers, who must constantly detain her a prisoner to prevent her from destroying her rivals, which would require the labours and attention of a much larger number than are necessary to keep her confined to her cell. On this account they never suffer her to come forth till she is perfectly fit to take her flight. When at length she is permitted to do this, if she approaches the other royal cells, the workers on guard seem greatly irritated against her, and pull, and bite, and chase her away; and she enjoys tranquillity only while she keeps at a distance from them. As her instinct is constantly urging her to attack them, this proceeding is frequently repeated. Sometimes standing in a particular and commanding attitude, she utters that authoritative sound which so much affects the bees; they then all hang down their heads and remain motionless; but as soon as it ceases they resume their opposition. At last she becomes violently agitated, and, communicating her agitation to others, the confusion more and more increases, till a swarm leaves the hive, which she

either precedes or follows. In the same manner the other young queens are treated while there are swarms to go forth; but when the hive is sufficiently thinned, and it becomes troublesome to guard them in the manner here described, they come forth unnoticed, and fight unimpeded till one alone remains to fill the deserted throne of the parent hive.—You see here the reason why the eggs that produce these queens are not laid at the same time, but after some interval, that they may come forth successively. For did they all make their appearance together, it would be a much more laborious and difficult task to keep them from destroying each other.

When the bees thus delay the entrance of the young queens into their world, they invariably let out the oldest first; and they probably know their progress to maturity by the emission of the sound lately mentioned. The accurate Huber took the trouble to mark all the royal cells in a hive as soon as the workers had covered them in, and he found that they were all liberated according to seniority. Those first covered first emit the sound, and so on successively; whence he conjectures that this is the sign by which the workers discover their age. As their captivity, however, is sometimes prolonged to eight or ten days, this circumstance in that time may be forgotten. In this case he supposes that their tones grow stronger as they grow older, by which the workers may be enabled to distinguish them. It is remarkable that no guard is placed

round the mute queens bred according to the Lusatian method, which, when the time for their appearance is come, are not detained in captivity a single moment; but, as you have heard, are left to fight, conquer, or die.

You must not think, however, from what I have been saying, that the old queen never destroys the young ones previously to her leading forth the earliest swarm. She is allowed the most uncontrolled liberty of action; and if she chooses to approach and destroy the royal cells, her subjects do not oppose her. It sometimes happens, when unfavourable weather retards the first swarm, that all the royal progeny perishes by the sting of their mother, and then no swarm takes place. It is to be observed that she never attacks a royal cell till its inhabitant is ready to assume the pupa, therefore much will depend upon their age. When they arrive at this state, her horror of these cells, and aversion to them, are extreme: she attacks, perhaps, and destroys several; but finding it too laborious, for they are often numerous, to destroy the whole, the same agitation is caused in her as if she were forcibly prevented, and she becomes disposed to depart, rather than remain in the midst of her rivals, though her own offspring.

But though the bees, in one of these cases, appear such unconcerned spectators of the destruction of royal personages, or rather, the applauders and inciters of the bloody fact; and in the other show

little respect to them, put such a restraint upon their persons, and manifest such disregard to their wishes; yet when they are once acknowledged as governors of the hive, and leaders of the colony, their instinct assumes a new and wonderful direction. From this moment they become the '*publica cura*,' the objects of constant and universal attention; and wherever they go, are greeted by a homage which evinces the entire devotion of their subjects. You seemed amused and interested in no slight degree by what I related in a former letter of the marked respect paid by the ants to their females; but this will bear no comparison with that shown by the inhabitants of the hive to their queen. She appears to be the very soul of all their actions, and the centre of their instincts. When they are deprived of her, or of the means of replacing her, they lose all their activity, and pursue no longer their daily labours. In vain the flowers tempt them with their nectar and ambrosial dust: they collect neither; they elaborate no wax, and build no cells; they scarcely seem to exist; and, indeed, would soon perish, were not the means of restoring their monarch put within their reach. But, if a small piece of comb containing the brood grubs of workers be given to them, all seem endued with new life: their instincts revive; they immediately set about building royal cells; they feed with their appropriate food the grubs they have selected, and every thing proceeds in the usual routine.

Reaumur relates an interesting anecdote, which strongly marks the attachment of bees to their queen when apparently lifeless. He took one out of the water quite motionless, and seemingly dead, which had lost part of one of its legs. Bringing it home, he placed it amongst some workers that he had found in the same situation, most of which he had revived by means of warmth; some however still being in as bad a state as the poor queen. No sooner did these revived workers perceive the latter in this wretched condition, than they appeared to compassionate her case, and did not cease to lick her with their tongues till she showed signs of returning animation; which the bees no sooner perceived, than they set up a general hum, as if for joy at the happy event. All this time they paid no attention to the workers who were in the same miserable state.

The laying of worker eggs begins in February, sometimes so early as January. After this, in the spring, the great laying of male eggs commences, lasting thirty days; in which time about 2000 of these eggs are laid. Another laying of them, but less considerable, takes place in autumn. In the season of oviposition, the queen may be discerned traversing the combs in all directions with a slow step, and seeking for cells proper to receive her eggs. As she walks, she keeps her head inclined, and seems to examine, one by one, all the cells she meets with. When she finds one to her purpose,

she immediately gives to her abdomen the curve necessary to enable it to reach the orifice of the cell, and to introduce it within it. The eggs are set in the angle of the pyramidal bottom of the cell, or in one of the hollows formed by the conflux of the sides of the rhombs, and, being besmeared with a kind of gluten, stand upright. If, however, it be a female that lays only male eggs, they are deposited upon the lowest of the sides of the cell, as she is unable to reach the bottom."

Section II.—The Drone, or Male Bee.

"Much abuse, from the earliest times, has been lavished upon the *drone* or *male bee*, and its indolence and gluttony have become proverbial.—Indeed, at first sight, it seems extraordinary that seven or eight hundred individuals should be supported at the public expense, and to common appearance do nothing all the while that may be thought to earn their living. But the more we look into nature, the more we discover the truth of that common axiom,—that nothing is made in vain.—Creative Wisdom cannot be caught at fault. Therefore, where we do not at present perceive the reasons of things, instead of cavilling at what we do not understand, we ought to adore in silence, and wait patiently till the veil is removed which, in any particular instance, conceals its final cause from our sight. The mysteries of nature are gradually opened to us, one truth making way for the dis-

covery of another: but still there will always be in nature, as well as in revelation, even in those things that fall under our daily observation, mysteries to exercise our faith and humility; so that we may always reply to the caviller,—'Thine own things and those that are grown up with thee hast thou not known; how then shall thy vessel comprehend the way of the Highest?'

In fine weather the drones, during the warmest part of the day, take their flights. Their life however is of very short duration, the eggs that produce drones being laid in the course of April and May, and their destruction being usually accomplished in the months of July and August. The bees then, as M. Huber observes, chase them about, and pursue them to the bottom of the hives, where they assemble in crowds. At the same time numerous carcases of drones may be seen on the ground before the hives. Hence he conjectured, though he never could detect them engaged in this work upon the combs, that they were stung to death by the workers. To ascertain how their death was occasioned, he caused a table to be glazed, on which he placed six hives, and under this table he employed the patient and indefatigable Burnens, who was to him instead of eyes, to watch their proceedings. On the 4th of July* this accurate observer saw the massacre

* The author counted, as early as the 16th of May, 1832, 175 slaughtered drones under the new ventilating method.

going on in all the hives at the same time, and attended by the same circumstances. The table was crowded with workers, who, apparently in great rage, darted upon the drones as soon as they arrived at the bottom of the hive, seizing them by their antennæ, their legs, and their wings, and killing them by violent strokes of their sting, which they generally inserted between the segments of the abdomen. The moment this fearful weapon entered their body, the poor helpless creatures expanded their wings and expired. After this, as if fearful that they were not sufficiently despatched, the bees repeated their strokes, so that they often found it difficult to extricate their sting. On the following day they were equally busy in the work of slaughter; but their fury, their own having perished, was chiefly vented upon those drones which, after having escaped from the neighbouring hives, had sought refuge with them. Not content with destroying those that were in the perfect state, they attacked also such male pupæ as were left in their cells; and then dragging them forth, sucked the fluid from their bodies and cast them out of the hive.

But though in hives containing a queen perfectly fertile, (that is, which lay both worker and male eggs,) this is the unhappy fate of the drones; yet in those where the queen only lays male eggs, they are suffered to remain unmolested; and in hives deprived of their queen, they also find a secure asylum.

What it is that, in the former instance, excites the fury of the bees against the males, is not easy to discover; but some conjecture may perhaps be formed from the circumstances last related. When only males are produced by the queen, the bees seem aware that something more is wanted, and retain the males; the same is the case when they have no queen; and when one is procured, they appear to know that she would not profit them without the males. Their fury then is connected with their utility: when the queen is impregnated, which lasts for her whole life, as if they knew that the drones could be of no further use, and would only consume their winter stores of provision, they destroy them; which surely is more merciful than expelling them, in which place they must inevitably perish from hunger. But when the queen only produces males, their numbers are not sufficient to cause alarm; and the same reasoning applies to the case when there is no queen."

Section III.—Workers.

"The proceedings of the *workers*, both in the hive and out of it, are numerous and multifarious. In their excursions to collect the various substances of which they have need, the principal object of the bees is to furnish themselves with three different materials—the nectar of flowers, from which they elaborate honey and wax; the pollen or fertilizing dust of the anthers, of which they make what is

called bee-bread, serving as food both to the old and young; and the resinous substance called by the ancients *Propolis*, *Pissoceros*, &c., used in various ways in rendering the hive secure and giving the finish to the combs. The first of these substances is the pure fluid secreted in the nectaries of flowers, which the length of their tongue enables them to reach in most blossoms. The tongue of a bee, you are to observe, though so long and sometimes so inflated, is not a tube through which the honey passes, nor a pump acting by suction, but a real tongue which laps or licks the honey, and passes it down on its upper surface, as we do, to the mouth, which is at its base concealed by the mandibles. It is conveyed by this orifice through the œsophagus into the first stomach, which we call the honey-bag, and which, from being very small, is swelled when full of it to a considerable size. Honey is never found in the second stomach, (which is surrounded with muscular rings, and resembles a cask covered with hoops from one end to the other,) but only in the first: in the latter, and the intestines, the bee-bread only is discovered. How the wax is secreted, or what vessels are appropriated to that purpose, is not yet ascertained. If you wish to see the wax-pockets in the hive-bee, you must press the abdomen so as to cause it to extend itself; you will then find on each of the four intermediate ventral segments, separated by the carina or elevated central part, two trapeziform whitish pockets, of a

soft membranaceous texture: on these the laminæ of wax are formed, and they are found upon them in different states, so as to be more or less perceptible.

Observe a bee that has alighted upon an open flower. The hum produced by the motion of her wings ceases, and her employment begins. In an instant she unfolds her tongue, which before was rolled up under her head. With what rapidity does she dart this organ between the petals and the stamina! At one time she extends it to its full length, then she contracts it; she moves it about in all directions, so that it may be applied both to the concave and convex surface of a petal, and wipe them both; and thus by a virtuous theft robs it of all its nectar. All the while this is going on, she keeps herself in a constant vibratory motion. The object of the industrious animal is not, like the more selfish butterfly, to appropriate this treasure to herself. It goes into the honey-bag as into a laboratory, where it is transformed into pure honey; and when she returns to the hive, she regurgitates it in this form into one of the cells appropriated to that purpose; in order that, after tribute is paid from it to the queen, it may constitute a supply of food for the rest of the community.

Though the great mass of the food of bees is collected from flowers, they do not wholly confine themselves to a vegetable diet; for, besides the honeyed secretion of the Aphides, the possession of which they will sometimes dispute with the ants, they

are very fond also of the fluid that oozes from the cells of the pupæ, and will suck eagerly all that is fluid in their abdomen after they are destroyed by their rivals. Several flowers that produce much honey they pass by; in some instances from inability to get at it. In other cases, it appears to be the poisonous quality of their honey that induces bees to neglect certain flowers.

When the stomach of a bee is filled with nectar, it next, by means of the feathered hairs with which its body is covered, pilfers from the flowers the fertilizing dust of the anthers, the pollen; which is equally necessary to the society with the honey, and may be named the ambrosia of the hive, since from it the bee-bread is made. Sometimes a bee is so discoloured with this powder as to look like a different insect, becoming white, yellow, or orange, according to the flowers in which it has been busy. Reaumur was urged to visit the hives of a gentleman, who on this account thought his bees were different from the common kind. He suspected, and it proved, that the circumstance just mentioned occasioned the mistaken notion. When the body of the bee is covered with farina, with the brushes of its legs, especially of the hind ones, it wipes it off; not, as we do with our dusty clothes, to dissipate and disperse it in the air, but to collect every particle of it, and then to knead it and form it into two little masses, which she places, one in each, in the baskets formed by hairs on her hind legs.

In the months of April and May the bees collect pollen from morning to evening; but in the warmer months the great gathering of it is from the time of their first leaving the hive (which is sometimes so early as four in the morning) to about ten o'clock, A. M. About that hour all that enter the hive may be seen with their pellets in their baskets; but during the rest of the day the number of those so furnished is small in comparison with those that are not. In a hive, however, in which a swarm is recently established, it is generally brought in at all parts of the day. He supposes, in order for its being formed into pellets, that it requires some moisture, which the heat evaporates after the above hour; but in the case of recently colonized hives, that the bees go a great way to seek it in moist and shady places.

When a bee has completed her lading, she returns to the hive to dispose of it. The honey is disgorged into the honey-pots or cells destined to receive it, and is discharged from the honey-bag by its alternate contraction and dilatation. A cell will contain the contents of many honey-bags.

The pollen is employed as circumstances direct. When the bee laden with it arrives at the hive, she sometimes stops at the entrance, and very leisurely detaching it by piecemeal, devours one or both the pellets on her legs, chewing them with her jaws, and passing them then down the little orifice before noticed. Sometimes she enters the hive, and walks

upon the combs; and whether she walks or stands, still keeps beating her wings. By the noise thus produced, which seems a call to some of her fellow-citizens, three or four go to her, and placing themselves around her, begin to lighten her of her load, each taking and devouring a small portion of her ambrosia: this they repeat, if more do not arrive to assist them, three or four times, till the whole is disposed of. When more pollen is collected than the bees have immediate occasion for, they store it up in some of the empty cells.

Huber was a long time uncertain from whence the bees procured the gummy resin, called propolis; but it at last occurred to him to plant some cuttings of a species of poplar (before their leaves were developed, when their leaf-buds were swelling, and besmeared and filled with viscid juice) in some pots, which he placed in the way of the bees that went from his hives. Almost immediately a bee alighted upon a twig, and soon with its mandibles opened a bud, and drew from it a thread of the viscid matter which it contained; with one of its second pair of legs it took it from the mouth, and placed it in the basket: thus it proceeded till it had given them both their load.

Mr. Knight mentions an instance of bees using an artificial kind of propolis. He had caused the decorticated part of some tree to be covered with a cement composed of bees'-wax and turpentine: finding this to their purpose, they attacked it, detaching

it from the tree by their mandibles, and then, as usual, passing it from the first leg to the second, and so to the third.

Bees in their excursions do not confine themselves to the spot immediately contiguous to their dwelling, but, when led by the scent of honey, will go a mile from it.

These insects, especially when laden and returning to their nest, fly in a direct line, which saves both time and labour. How they are enabled to do this with such certainty as to make for their own abode without deviation, I must leave to others to explain. Connected with this circumstance, and the acuteness of their smell, is the following curious account, given in the *Philosophical Transactions* for 1721, of the method practised in New England for discovering where the wild hive-bees live in the woods, in order to get their honey. The honey-hunters set a plate containing honey or sugar upon the ground in a clear day. The bees soon discover and attack it: having secured two or three that have filled themselves, the hunter lets one go, which, rising into the air, flies straight to the nest: he then strikes off at right angles with its course a few hundred yards, and letting a second fly, observes its course by his pocket-compass, and the point where the two courses intersect is that where the nest is situated.

Water is a thing of the first necessity to these insects; but they are not very delicate as to its quality,

but rather the reverse; often preferring what is stagnant and putrescent, to that of a running stream. I have frequently observed them busy in corners moist with urine; perhaps this is for the sake of the saline particles to be there collected.

A new-born bee, as soon as it is able to use its wings, seems perfectly aware, without any previous instruction, what are to be its duties and employments for the rest of its life. It appears to know that it is born for society, and not for selfish pursuits; and therefore it invariably devotes itself and its labours to the benefit of the community to which it belongs. Walking upon the combs, it seeks for the door of the hive, that it may sally forth and be useful. Full of life and activity, it then takes its first flight; and, unconducted but by its instinct, visits like the rest the subjects of Flora, absorbs their nectar, covers itself with their ambrosial dust, which it kneads into a mass and packs upon its hind legs; and if need be, gathers propolis, and returns unembarrassed to its own hive.

Bees are extremely neat in their persons and habitations, and remove all nuisances with great assiduity, at least as far as their powers enable them Sometimes slugs or snails will creep into a hive, which with all their address they cannot readily expel or carry out. But here their instinct is at no loss; for they kill them, and afterwards embalm them with propolis, so as to prevent any offensive odours from incommoding them. An unhappy snail,

that had travelled up the sides of a glazed hive, and which they could not come at with their stings, they fixed, a monument of their vengeance and dexterity, by laying this substance all around the mouth of its shell. When they expel their excrements, they go apart that they may not defile their companions: and in winter, when prevented by extreme cold, or the injudicious practice of wholly closing the door of the hive, from going out for this purpose, their bodies sometimes become so swelled from the accumulation of feces in the intestines, that when at last able to get out they can no longer fly, so that, falling to the ground in the attempt, they perish with cold, the sacrifice of personal neatness. When a bee is disclosed from the pupa and has left its cell, a worker comes, and taking out its envelope carries it from the hive; another removes the exuviæ of the larva, and a third any filth or ordure that may remain, or any pieces of wax that may have fallen in when the nascent image broke from its confinement. But they never attempt to remove the internal lining of silk that covers the walls, spun by the larva previous to its metamorphosis, because, instead of being a nuisance, it renders the cell more solid.

After all, there are mysteries, as to the *primum mobile*, amongst these social tribes, that with all our boasted reason we cannot fathom, nor develop satisfactorily the motives that urge them to fulfil in so remarkable though diversified a way their different destinies. One thing is clear to demonstration,

that by these creatures and their instincts, the power, wisdom, and goodness of the GREAT FATHER of the universe are loudly proclaimed; the atheist and infidel confuted; the believer confirmed in his faith and trust in Providence, which he thus beholds watching, with incessant care, over the welfare of the meanest of his creatures; and from which he may conclude that he, the prince of the creation, will never be overlooked or forsaken: and from them what lessons may be learned of patriotism and self-devotion to the public good; of loyalty, of prudence, temperance, diligence, and self-denial."

We have thus concluded a concise account of the bee, for which we are eminently indebted to the Rev. W. Kirby, and W. Spence, Esq. We advise all who are desirous of an intellectual treat to purchase their work, entitled an "Introduction to Entomology;" and we believe a careful reading will induce frequent perusal. Then with them we shall admire the wonder-working hand of the Great Author of the highest intelligence and instinct, and say, in the language of the royal Psalmist,

"O Lord, how manifold are thy works! in wisdom hast thou made them all: the earth is full of thy riches."

CHAPTER III.

COTTAGE SYSTEM EXPLAINED.

The common remark, so often repeated when any new suggestion is thrown out, that "what suited our fathers is surely good enough for us," borders so much on wilful ignorance that it need only be noticed to shew its absurdity. Great attempts have been made to improve the management and general culture of bees; and yet so wedded are country people to their own antiquated notions that *they will not* learn better. Huish says, "Before the system, which is now acted upon, be changed, it will be necessary to impress on the minds of the country people the great advantages to be derived from the culture of the bee, and then to impart to them the most simple method of performing the necessary operations. One of the principal causes of the decline of the culture of the bee in this country arises from a total want of encouragement, and a truly gothic ignorance on every point connected with it; it is a natural consequence, that the principal and indeed only method of exciting the country people to apply themselves seriously to the management of bees, is to present them with that

sort of hive which is not of great expense, which offers to them an easy, simple, and commodious method of management, and which embraces every part of their economy; by which means, the poorest cultivator being able to reckon, with some degree of probability, on the life and preservation of his hives, may also hope with greater reason to see his labour and pains rewarded. I do not hesitate to affirm, that the system at present followed by nine-tenths of the keepers of bees is built on error and antiquated prejudices. How are those prejudices to be obviated and annulled? Accustomed from the earliest period to tread in a beaten track, the cottager will not turn into a different one, unless a very powerful example be set before him, and he sees a greater advantage resulting from the adoption of the new system, than continuing in the old one. I have universally found the lower classes of people averse to all instruction in the management of their bees; their fathers, grandfathers, and so on up to Noah, followed this or that method, and therefore it must be good. All innovation is dangerous, and considered as infringing the sanctity of antiquated customs.

Should a scientific and intelligent man be brought into their immediate neighbourhood, who is willing to diffuse the knowledge which he has gained, and who can place before their eyes the immediate beneficial consequences resulting from the adoption of a different method than has been hitherto

pursued, some hope might be entertained of the culture of the bee becoming more general; but then he must not pretend to force instruction upon them. Conviction must follow of itself, and then, and then only, will it be productive of good."

The original form of hives unquestionably was not uniform, because, before man had reduced the care of bees to a system, they located themselves in rocks or trunks of trees, where both space and ventilation must have been much greater than in the confined abodes into which our favourites are now placed:—but as bees will work in hives of almost any shape, if not too large, we shall first describe those which are most commonly seen in cottagers' gardens, with the modes of management, and afterwards proceed with the improvements.

The best time for establishing an apiary is just before the taking-up season, which is *generally* about the latter end of August: for then bee-keepers reserve as many of the best stocks as they judge expedient for their next summer's supply; and therefore, after that period are not disposed to part with any, unless at an advanced price: whereas, by purchasing some time before, a choice may be made of the *best*, and at the accustomed rate.

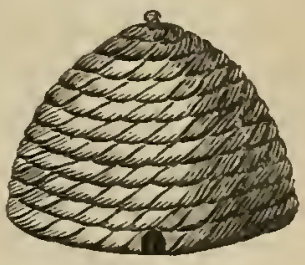
They should be selected by a skilful person, either in a cool evening, or very early in the morning. By tapping about the hive, a good idea may be formed, whether or not it is full of bees and combs. But for greater certainty, turn those that seem

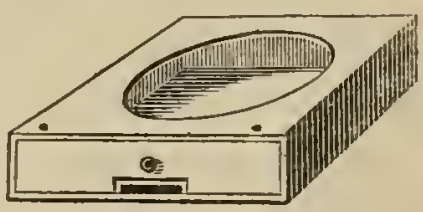
heavy upon the edge of the hive, and observe if the interstices between the combs are crowded with bees, and the combs worked down to the floor. If white, or of a light yellow, it denotes their being of the present year's produce, and fit for the purpose; but if they are of a very deep yellow, or brown, they are of the last season, and not so proper; while those that are dingy, or *blackish*, are old, and wholly unfit to furnish a prosperous apiary. To avoid deception, observe, that though a hive may have the *edges* of the combs of a light yellow, they may be old stocks nevertheless, whose combs the preceding year not having been completed, have in the present had new borders added to them of virgin wax, so that they look like young stocks. Look carefully *between* the combs, as far as the bees will admit; and if the interior parts appear favourable, form a judgment accordingly. The hive should be poised in the hand; and if it be about half-bushel size, and weigh twenty-five pounds or upwards, it is another test of its being a good stock. But in old stocks, your judgment must not rest on the weight alone, as great part of the combs may be crammed with old farina, and other impurities, as will be mentioned hereafter.

One good *stock* bought at the proper time, is worth two recent swarms bought in the spring; for such a stock will swarm once or *twice*, or yield *two* or *three* hives full of honey; whereas, from a swarm, little or no profit can be expected the *first* year.

But should the proper season have been neglected, a *prime* or *first* swarm should be sought, at least large enough, in common situations, to fill a peck, and if a good one, half a bushel. Small swarms will turn to little account, and baulk the expectation, except two are united under one queen.

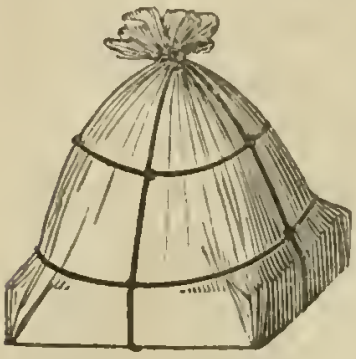
When your mind is fully made up to a purchase, adopt the following plan to get your bees home :—A common straw hive, we suppose to be full of bees, and the time of your purchase late in August or early in February: now to move them with the greatest ease to yourself and safety to the bees, make a flat square box, to measure as much across as the diameter of your hive, the bottom of which must be free from cracks, the back and sides equally sound, front pierced, with a long opening only large enough to allow bees to pass through, but loose when the pegs are withdrawn. The top to be fastened on; but the centre cut out to within one inch in the narrowest parts. The hive is to be placed thereon with a steady hand.





When you wish to remove a hive a considerable distance, put two flat pieces of wood, flush, across the inside of the box, diagonally, to support the combs and prevent their falling, and close the front door-way: when, having spread a large strong cloth

on the ground, place the box and hive, with its door stopped by wet clay, in the centre, and then gather up the cloth into your hand and make it fast with cords, especially just above the square of the box and in the middle of the hive: this will keep it from slipping, and it would travel a hundred miles with perfect safety. On arriving at its destination do not take the hive off the box; but open the little cut in front of the box, and let it remain until April, because the bees may be occasionally fed by removing the front board much more safely and cleanly than by the long spouts, and without exposing them to the cold. This box would certainly not cost more than two shillings, and might be kept solely for the removal of hives provided they are placed on their own stool immediately on arrival. Hives should be moved in the evening or very early in the morning, and raised, by three or four wedges, some hours before, otherwise many bees will remain on the floor at the time, and be very troublesome.



Some cottagers place each hive on a moveable board, a little larger than its diameter, in which case this box would be useless, as the floor ought not to be taken from the bottom of the hive.

The next thing to be named is the place to put the bees, where they will be best protected. The mouth of all hives must face the south-east.

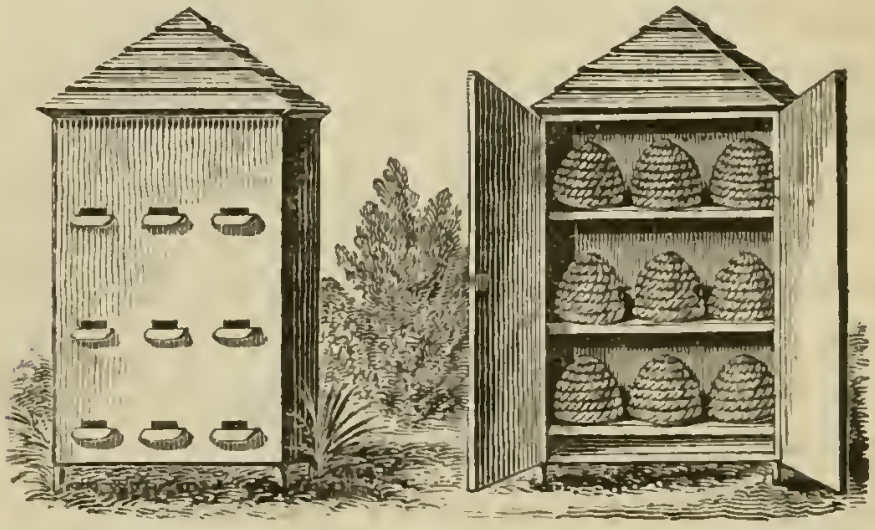
The reader must bear in mind we are still on the Cottage system, and what follows applies to that imperfect mode.

The most *inefficient* is to procure a ledge in a wall, or low bench, perhaps an old chair or similar article, whereon to place the hive, and over the hive itself there should be a cap of thatch, made of clean rye straw; and it should not only be new when first put on the hive, but a new one should be made to supply the place of the former every three or four months: for when the straw begins to get rotten, as it soon does, insects breed in it, its smell is bad, and its effect on the bees is dangerous. This rude mode of protection exposes the bees to the depredations of mice, rats, and other vermin, from the ease with which they can ascend the legs of the stool, and a sure harbour for a host of plundering insects. A cracked milk-pan instead of the rye-covering is an improvement by those who have progressed one step!

Amateur holders of bees, who prefer the "way their fathers trod," have improved on the out-door exposure to wet and insects by putting their hives into

a bee-house, which, in some gardens, is a very ornamental object. The purse generally regulates the beauty.

These houses are built about eighteen inches deep from front to back, four feet wide, and six feet high, with three shelves; and are capable of containing nine good-sized hives, three in a row. The front is a fixture, perforated with nine holes opposite the



places where the nine hives stand on the shelves; and before each hole an alighting board. The holes must be three inches long, and a quarter of an inch high; but opening larger on the inside. The back is inclosed with two doors, which open like those of a wardrobe, and enable the operator to examine his hives without annoyance, while they are safe from weather and enemies. The *outside* of the house must be well painted to protect it from the sun and rain.

The straw hive, it is evident, is the simplest mode of providing habitations for these useful insects;

but to work this system, swarming is indispensable: the reader is therefore referred to the general directions on swarming which occur under a separate head, as they apply to *every hive* which is subject to that inconvenience.

At the fall of the year, to obtain honey, the bees must be totally destroyed, and the hives left vacant for the increase of the following year. See fuller particulars under the head Fumigation.

In this plan the following difficulties present themselves:—

1st.—In adopting glass windows to inspect the labours of the bee, so that the bee-master is uncertain as to what is going on within the hive.

2nd.—The absolute impossibility of taking away part of the honey without taking the whole, or if you do get at some of the combs by the stupifying process described in the chapter on Fumigation, the commotion and loss will subject the bees to starvation in the winter.

3rd.—The certainty of having impure honey, because the bees deposit bee-food *with* the honey, to support their young brood when the heat of the hive is such as to be congenial to the production and rearing of young brood.

4th.—The impossibility of increasing the size of the hive in such a way as to be of any essential service:—an eke* may be *added;* but it is not so easy to take it off again.

* See Chapter IV. pp. 61, 62.

5th.—The necessity, in swarming time, of having a watcher, to give the earliest notice of the movements of a swarm.

6th.—The loss of time which must necessarily be incurred while the bees are attending the numerous young queens, who are to lead the casts or remain at home.

7th.—The immense disappointment which very often occurs of the loss of sometimes two-thirds of the hives, which were expected to have stood the winter; but which, not having sufficient time to establish themselves, necessarily die.

8th.—The difficulty of feeding, and the liability of vermin obtruding themselves into the combs; besides the dissatisfaction which must arise to those who hope for a little return, to find one hive after another occupied by late swarms, which have had time to commence combs at the top of the hive, *ready for the honey*; but who apparently were lost in the magnitude of their apartment, and gave it up in despair, *to wait for spring*.

CHAPTER IV.

ON THE STORIFYING SYSTEM, OR, PLACING ONE VESSEL ON ANOTHER.

"Knowledge and wisdom, far from being one,
Have oft times no connection. Knowledge dwells
In heads replete with thoughts of other men,—
Wisdom in minds attentive to their own."

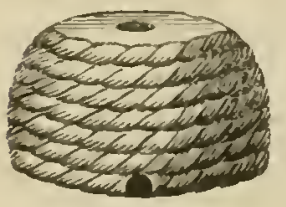
THE term *storifying* has been used by many writers, and from the peculiarly persevering endeavour made by one or two bee-keepers to make the plan universal, it has almost got a name from them: it really means a method of increasing the size of a working-hive, by adding stories or floors to the top, or being made basements on which the hive is placed.

The old proverb, that "Necessity is the mother of invention," is strictly exemplified in the system described in this chapter. In the last a particular description of the simple cottage hive was given, without reference to any improvement, because many individuals still contend that to be the easiest to manage.

An author, who writes a great deal for the poor,

and who is practically acquainted with their temporal necessities; but who has inculcated many principles in his works, in opposition to the commands of God, advises his readers, that "it is best never to keep the same stall, or family, over two years, except you want to increase your number of hives. The swarm of *this summer* should always be taken in the autumn of next year. It is whimsical to *save* the bees when you take the honey. You must *feed* them; and, if saved, they will die of old age before the next fall; and though young ones will supply the place of the dead, this is nothing like a good swarm put up during the summer." This is the oldest method of destroying bees, and disheartening bee-masters; and it is astonishing that a practice, issuing in such results, should be republished in these days of education and thought.

To assist those who still adhere to the common hive, we introduce the improvement of one, made rather flatter than customary, with a hole left in the centre of the roof. These hives are sometimes made with a flat board, with a hole therein, worked into



the top, which is kept fast closed when the swarm is at first introduced, but the plug is afterwards taken out, and the hole covered by a glass. Into this glass the bees rise very rapidly, filling it with comb, and if renewed often, or given of a sufficient size at first, much honey may be got, provided your stock was a strong *swarm*

the preceding year; but if it was an old stock, your bees will be so engaged with the brood, in consequence of their immense numbers and heat below, that the glasses will be filled with brood-comb and bee-food mixed with the honey, preparatory to the egress of a swarm and one or two casts. Still these glasses are an improvement, although they cannot be worked out of a bee-house. Note, in this case most particularly, that your glasses must be covered with a thick cloth, or box, *to exclude light*, or your bees will not avail themselves of the enlarged space you have provided for them.

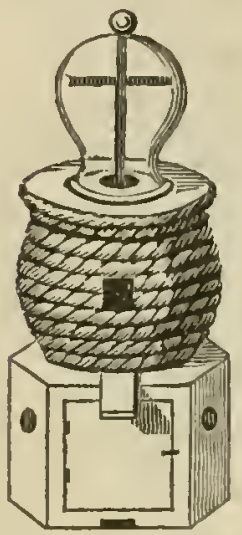
We noticed, in our first chapter, the method of taking a glass; and surely a humane man would adopt it rather than destroy, by sulphur, part of a stock of bees that had yielded him a supply, although not quite so much as they might have done under different treatment. But, though this plan is an improvement, necessity has induced further attempts. Even supposing the flattened hive is used, and the glass put on the top, yet the vast multitudes, in good hives, require more *breathing* room: they are too hot, and give distinct evidence of their necessities, by hanging outside the hive and ceasing to work; these apparently lazy fellows are really incapacitated from work for want of a cool store-room, and are only waiting until a young queen is strong enough to quit her cell and take the command of the hive,

when the oldest queen leaves the over-heated apartment, and leads the swarm. To prevent this an *eke* has been added, which is a simple hoop of materials similar to the hive, fitting the bottom edge exactly:

this is put into the bee-house, and the hive to be enlarged is placed upon it. This enables the waiting bees to go to work, and thus swarming is retarded. But as it is a temporary enlargement, the reason which induced the necessity of enlarging the apartment, is increased when the eke is full. In fact, a larger hive at the beginning would have done equally well, without the trouble of putting on the eke, and disturbing the bees. These improvements, for they certainly are such, arose from the inconvenience experienced by swarming, and were at first supposed capable of preventing that natural consequence of an over-heated apartment; but experience has proved the fallacy of the opinion. Hence speculation went to

work on the storifying system—and many ingenious methods were proposed. We will take them one by one, and, at the close of this part of the work, attempt to shew some of the inconveniences. The systems have been divided into two classes, termed *super*-hiving and *nadir*-hiving; or, in plain English, hiving *above* and hiving *below*. One party maintains, that the natural mode of operation pursued by bees is to place the honey stored for future use, in the most remote part of the hive; whilst the opposite opinion is, that, as bees, unless greatly annoyed for want of room, as in the experimental hives, always lay the foundation of a comb first at *the roof* of their hive and work downward, the natural and easiest method to give space is, to increase that part of the hive nearest to the bottom of the hanging comb. Both systems are founded on fact, though both are liable to objection; for bees work *upward* in a glass placed over a hive because the greatest heat is at the bottom, while bees newly placed in a straw hive begin at the top of the hive, because *there* the heat is greatest; but we proceed. The Rev. John Thorley, who wrote on this subject 100 years ago, quotes the following remarks from Mr. Rasden:—"The principal reason why bees swarm is the want of room; therefore, in colonies where they are not at all straitened, they seldom or never swarm, except through mismanagement." Hence we see one great principle was known. To accomplish his object, he made an octagonal box, with holes cut in the top of

it, a back window with a shutter to examine the works, and a low door-way in front. Into this hive the swarm was placed, and was left to itself until full, when the piece of board used to cover the holes was withdrawn after the straw hive was placed thereon—and then, if the second hive was filled, the glass was placed above. To take the honey from this hive he directs that "when by the help of the back window, you find a sufficient quantity of honey, and sealed, in the middle box, and the lowest box half full of combs, also few bees in the uppermost box, proceed thus:—At or about five o'clock in the afternoon, drive close the sliding shutter, under the hive or box to be taken from the colony, with a mallet. If the combs are new, you may force the shutter home without that instrument, with your hand; be sure it is close, that no bees may ascend into the hive or box to be removed.



After this, shut close the doors of your house, and leave the bees thus cut off from the rest of their companions for the space of half an hour, or more. In this space of time, having lost their queen, and other company, they will fill themselves with honey, and be impatient to be set at liberty. Then opening the back window, you will see them in the greatest hurry and tumult, running up and down,

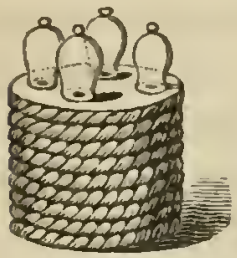
attempting, one way or other, to disengage themselves from so disagreeable an imprisonment.

If, in this interim, you examine the box or boxes beneath, and observe all composed and quiet there, then you may be confident you are so far right, and the queen is in safety. Hereon so far raise the back part of the hive, or box, by a piece of wood or other material, thrust underneath, as may give the prisoners room to come forth; who taking wing will return to their fellows—delightful to behold! then lifting the box from off the colony, turning the bottom upwards, cover it with a cloth all night; and if any bees be left in it, let them out the next day, and they will return to the colony.

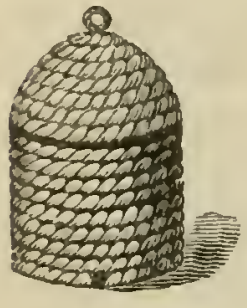
Thus you have a hive or box of honey, and all your bees saved; which will recompense you by their future faithful labours."

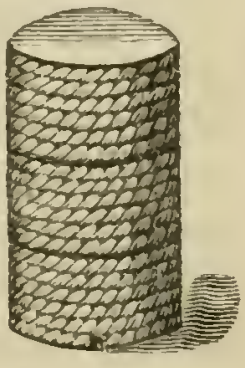
In the preceding description of Thorley's hive, we see that the principle of storifying is not a new discovery, and therefore has had the test of experience. Although exceedingly clever, and on the first appearance a very easy method, it is found to be faulty. Other modifications of the storifying system may be introduced here, more as a record of such hives, and as hints to those who are studying, than as any material alteration in a *system*. They may be compared to the dialects of a language, which, although traceable to one common root, are yet so dissimilar as even to confound those who

are masters of the original; for this simple reason,—



that they have not been used to them. One person introduces a flat board on the top of a round cottage hive, and places four glasses on it; while others maintain the absolute necessity of not disturbing the bees, and close in the top of their eight-sided box, with a flat board. Another makes a straw cap, which he places over the same hive, which cap is removed when full, or thought to be so. Another places one round hive upon another, exactly on Thorley's principle; but all the hives are of a size. Others again consider octagonal boxes more preferable than round hives; and some that these boxes should be perforated for glasses like the straw hive figured above. These varied modes no doubt are the result of experiments made by practical bee-masters, who have not been able to manage their labourers to their satisfaction—they therefore propound some new-shaped hive, and *guess* it may answer the purpose; but they all prove that a grand principle was yet undiscovered.





Having shewn the system of *super*-hiving, as exemplified in Thorley's hive, and the varied manœuvres of other bee-masters since his time, we pass

on to those who maintain that *nadir*-hiving, or hiving *below*, is the preferable mode; and as these writers press their mode as the best, alleging that nature is followed, because the bees commence their comb at the roof of their hive, and work downwards, their system demands a clear description.

Mr. Keys is a great advocate of the storifying principle, by placing full hives on empty ones; and to such celebrity had he attained that subsequent writers have even denominated the brass plates (*See* p. 80) which are used to separate his boxes, "Keys' dividers;" but as Mr. Huish is not sparing in his censure of Mr. Keys' plan, we will omit the calculations as debateable, and merely give a description of the mode of operation. Mr. Keys may have resided in a prolific bee-country, while Mr. Huish may not have been so favoured. If writers had more charity and less consequence, readers would be spared much unnecessary annoyance. Mr. Keys says,—

"Of all the methods which have hitherto come to my knowledge for the conducting of bees, that of *storifying* undoubtedly yields much the greatest profit, and is the most congenial to their natural habitude, and style of working.

By storifying is meant the setting of one, two, or three hives over each other, as *duplets* or *triplets*.

A good storifier, that has not swarmed, or has had the swarm returned, will increase thirty pounds in seven days, in a *favourable situation and season*: whereas a single-hived stock in the same apiary and

season, that has swarmed, will not increase above five pounds in the same time; for every swarm, the least as well as the greatest, is provided with a queen, equal in fecundity to the queen of the largest stock; and as the brood she brings continually demands the labour and attendance of probably near *half* the bees, this circumstance renders the other moiety, from the smallness of their number, unable to accumulate a large quantity of honey in the short time it mostly abounds. Whereas, by doubling and trebling the hives, the bees are never at a stand for room to extend their combs, as fast as requisite for honey or brood.

The queen often lays two or three hundred eggs in a few hours, which occasions as sudden a disappearance at the stated period, and which accounts for that great *thinness* observable in hives after the swarming season is over, as if a swarm had escaped. This likewise demonstrates, that at the *general* time of *deprivation*, all hives, or stocks, according to their populousness, are composed of bees of *all ages*, from those in embryo to those of old age. Consequently, although individuals die daily, young ones rise to birth, to succeed them, as do the human race in towns and cities. But, by storifying, the family is perpetuated to any length of time, without *the cruel necessity and trouble of destroying indiscriminately both old and young.* (*See* Chap. V.)

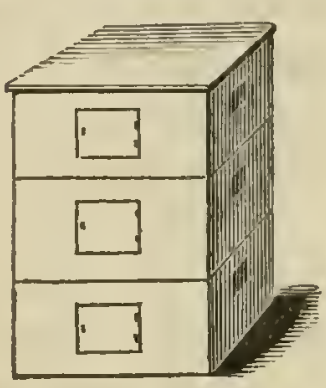
The story method can in no case be prejudicial, though the bees should be *prevented thereby from*

swarming: on the contrary, *it would be a great advantage if it did so;* for then artificial swarming would not be wanted to perpetuate stocks, which would be effected without such assistance. Writers have, however, followed each other, by asserting that by storifying no swarms will rise. *From long experience I am certain of the reverse.* When duplets or triplets do not swarm, it is *not* from *that cause:* it is from abortions of the royal brood, and several other casualties.

The advantages of this mode are, 1st, In avoiding the unnecessary and disagreeable trouble of *suffocating* the bees. 2nd, In relieving swarms when too large. 3rd, In preventing idleness in their lying out. 4th, In the uniting of swarms. 5th, In the means of cleanliness and wholesomeness. 6th, In preserving them from moths, mice, and other insects, by the frequent shifting of the hives. 7th, In giving ample and timely enlargement. 8th, In being provided against bad seasons. Lastly, In taking but little room in an apiary: as for instance, four stocks will require no more ground to stand on than they had at first; while common hives will demand twice or thrice as much for swarms, but producing less honey.

The *indications* for storifying stocks, are the appearance of an increase of numbers, and in their activity, favoured by the mildness of the season. If the stock be a last year's swarm, set a duplet *over* it; and as soon as that seems, by its weight, to be

three parts full, set a triplet *over* the duplet; which last, when full, or nearly so, is to be taken off, and *probably* will be all entire virgin honey, and without brood. Then raise the duplet, or double hive, by placing a triplet *under* it. But if the strength of the stock is great, and there is plenty of honey pasturage, so that another triplet may be expected to be filled, place the triplet over, instead of that which was taken off. Perhaps, in some good seasons and situations, *three* or *four* triplets may be taken, if they are opportunely applied.



But if the stock is of two years' standing, it must be raised on a nadir; and as often as it requires enlargement, take the superior hive off, and put a triplet in its place; and proceed thus as occasion may require. These two methods of super-hiving the *last* year's swarm *one* year, and the *next* of *nadir*-hiving the same stock, will be a sure means of obtaining the greatest quantity of *virgin honey*, and the largest quantity of the *best wax*.

Observe, in all cases, when hives are set over each other, that if the nadir is judged to be about three parts full, the door of it must be stopped, and that of the duplet opened, or the bees will not so soon be tempted to ascend, to work in the duplet: nor will this procedure increase the labour of the bees in

the meanwhile, as the way down is as short as the way up.

On the contrary, when a hive is placed under, the door of it must be stopped for a week or two, or till there is reason to think there are some combs made in it; and then it is to be opened, and in two or three days after shut again, disguising it with a cloth, &c., hung before it, for two or three days.

Be particularly careful not to let the stocks be crowded, before they are storified. For if a princess is impregnated early, it may occasion a swarm to rise suddenly: for often great numbers of brood are hatched together, and therefore from want of room become ferocious, and occasion much inconveniency to the apiator and bees, but presently become peaceful and satisfied on enlargement; for an additional hive having communications in direct line with the combs of the hives added, the bees are led to esteem the whole as one hive, in a few days after its application.

In some *critical* days or weeks, when honey dews are plentiful, or white clover, or other pasturage is abundant, the quantity of honey collected in a few days will be almost incredible, if they have room enough to lodge it, filling a hive in *seven days;* often more than can be accumulated in a whole season." This however is a very rare occurrence.

"But the advantages arising from additional hives are entirely lost in the old *single* method.

The duplets are in general not to be taken off till

late, lest the queen should be therein, *or it be mostly filled with brood.* But super-triplets may be always taken as soon as filled.

Bees never begin to work in an additional hive, until new combs are wanted for eggs, or honey; and then the bees will begin to hang down, in ranges, or curtains, which is always a sign they have begun to make combs.

Bees often want enlargement before swarm time, which is denoted by their idly playing about the door and hive. It is the owner's fault and loss if he suffers it to continue.

Duplicated boxes will sometimes appear full of combs and bees, through the back windows, though perhaps they are not above a quarter or half filled, the combs being only at the back.

If the bees of a triplet lie out, before the usual time of deprivation, it should be taken and placed at a considerable distance, and the duplified stock raised on a nadir hive: if, in two or three hours after, the bees of the stock seem quiet, and work as before, as well as those removed, it is a sign they have a queen in each; and the hive taken may be reserved as a stock, if such is wanted, or *fumed*, and the queen taken away: most likely there will be much brood, which may be set over a weak stock, or returned again to its mother stock.

In case duplets have idlers, they are to be raised on a triplet, and in about a month the superior hive is to be taken off. For when lying out in hot

weather, though their hives are not full, and the swarming season is past, the bees will not enter notwithstanding; but by adding a nadir hive, the accommodation of a spacious and cool hall to regale themselves will induce the idlers to enter it.

If it is suspected that bees are idle (which, though they do not cluster out, may be discovered by their not being so active as their neighbours), turn the hive up in the middle of the day: and if the combs are partly empty, it may be concluded they have either lost their queen, or she is unprolific, or is without drones; in which case they are to be slightly fumed in the evening, and set over another stock; particularly a weak one to strengthen them.

But if the stock is abundant in bees, and most likely in honey, let them stand till a young queen can be taken from a swarm; when placing her just within the door, she will be joyfully received. Otherwise, if it is about the middle of the season, fume, and place them over a stock; and by that means it will produce a very large quantity of honey.

Scanty breeders produce but little honey or brood; so that, whilst other stocks are rapidly increasing in riches, these will barely get enough to support themselves in the winter.

Empty combs placed in a duplet will not entice them the sooner to work therein; for till the hive is completely full, and they are in want of others, they will not ascend, which in very dry or very wet seasons may not happen for a considerable time: never-

theless, from being ready they may be of considerable advantage.

About the tenth of July the *upper doors* of all storied stocks should be closed, to induce the queen with more certainty to descend, and breed in the *lower* hive, except it is *designed to be taken;* for then the door is to be shut, and the upper one opened.

It often happens that in poor situations, or in a long season of very inclement weather, neither duplets nor triplets will have work therein: and this is not imputable to a bad method of management, or want of conduct, but wholly to a failure of the resources of pasturage, or of opportunities to gather it; which sometimes has been so great as to prevent the generality of stocks from procuring a sufficiency for their own winter's supply. It is necessary in summer, when a hive has few bees, to strengthen it with a portion of bees from one that is strong. This will enable the queen to breed fast, and the hive will prove as prosperous as any hive you have. But in all such reinforcements, the hive so replenished should be set at as great a distance as your convenience will allow for several weeks. This is a rule to be observed in all such cases.

Stocks that have emitted swarms can but rarely be expected to yield a duplet that summer, unless the swarm is returned. Much less can a swarm do it, though I have known some exceptions in extraordinary situations.

To *replenish* a stock that is scanty of bees, set some empty combs, and pour the cells of one side full of sugared ale, or platters of it, slightly covering it with a little hay or herbs, to prevent the bees from damaging themselves in it: set it on a hive-floor in the morning, and place an empty hive over it, in the midst of the apiary. A great multitude of bees will be attracted by the odour, and assemble round the feast. As soon as that is perceived, stop the door of the hive until night; when the bees having ascended to the top of the hive, take it, and give them a slight fuming, and place them over or under the stock that most wants their assistance.

If a queen is killed or dies in the summer, it may be known by the bees not carrying in any farina, or by the door of the queenless stock being much crowded by plundering bees, as well as that to which the robbers belong. Both hives appear prodigiously active, as though a honey dew had commenced, and with a clear and uninterrupted buzz, with crumbs of wax about the door. Immediately stop the door of the unfortunate stock, and unstop it in the evening: the interlopers will then fly home. Early in the morning, take the hive to a proper distance, and fume it, or keep the bees confined till next day, in a darkened room. Then will these very peaceably and readily quit the hive on a little drumming on the sides. If the hive has much honey, cut the combs out; but take care of those that have brood, and add them to some other stock. The bees, however,

will continue working till all the young are sealed up. If a like accident happen in winter, take the bees out, put them to a stock, and take the honey.

In the want of a hive upon a sudden demand of enlargement, and not having a proper one in readiness, set a common one with bars across it, in a pail or bucket, and place the stock over it; next night close the joining, and at the accustomed time separate it by the dividers, and take the bottom one way.

Hot summers have sometimes so softened the combs as to cause them to fall, occasioning thereby the smothering of the bees, and ruin to the stock. To prevent this give them enlargement, and lift up the single hives *behind: screen them as much as possible from the sun, by large boughs, often pouring plenty of water about the bee-houses. If ventilation could be applied to these hives no such disastrous consequence would follow.

Dr. Bevan,† who is a great advocate for the system of placing one box upon another, has given a very clear description of the size of the boxes most suited to the storifying process: we prefer, however, to give the words of Mr. Keys, because Dr. Bevan has evidently drawn his information from that source:—

"Bee-boxes are best made of seasoned yellow

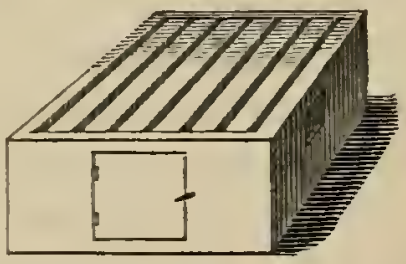
* This passage is difficult to understand if applied to the storifying process, in which connection it stands.

† Dr. Bevan on the Honey Bee, its Natural History, Physiology, and Management. London, Baldwin and Co. 12mo. 1827. Price Nine Shillings, boards.

deal, free from knots, and one inch thick. The boxes are to be *ten* inches high, and *twelve* square; clear in the inside. One of the sides is to have a pane of *glass*, of the whole width, and six inches in height, with a shutter half an inch thick, to be let into a bevel at top, and rest on a ledge at bottom, and to fasten with a button: this is to be esteemed the *back*. There must be a *door-way* in the bottom edge of the front, four inches long, and five-eighths in height, exclusive of the *threshold*, which is to be one-eighth of an inch thick, to be let into the edge of the box, and on a level therewith.

A slip of wood is to be fitted for a door, to turn outward to the left, on a pivot or pin, and to shut in a bevel, with a small notch, that it may be opened by the point of a fork. It must shut so far in as to be flush with the side of the box.

The *top* is to be composed of *six* slips of wood, which I name *bars*, three-quarters of an inch thick; the two outermost, one inch and a quarter broad; the other four, one and a half. The ends of the second and fifth bars are to be let into the front and back edges of the box, and flush with the outside; the remaining four bars are to be of a due length, to pass easily *withinside* from front to back. Two fillets, each an inch broad, are to be braided to the bars, or rather let in transversely, of the



diameter of the box, and near their ends, not only to keep the bars at half an inch exact distance from each other, and from the sides of the box, but to connect the whole like a frame together, and to take *in* or *out*, with the combs fixed to them, at pleasure. The bars (1st, 3rd, 4th, and 6th) serve also to prevent the frame from slipping from its situation. The top, thus made, will have *six* bars, and *seven* apertures, or openings, like the straw hives.

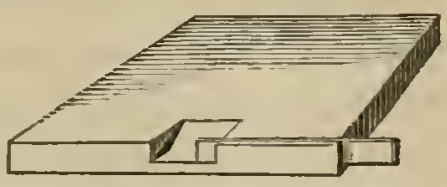
There is to be but *one close cover*, or lid of wood, three quarters of an inch thick, to *three* boxes; which is to take off and on by means of four screws, one at each corner.

Loose floors are to be provided with the boxes, to be planed on one side, and filleted at the ends to prevent warping, and of an inch more in their dimensions than the tops of the boxes. If a board broad enough cannot be had, a lesser must be added, rabbeted, and dowelled thereto. *One* floor only is necessary for a suite (three) of boxes, but two or three spare ones will often be wanted."

Dr. Bevan suggests a valuable improvement in the door-way:—he adds,

"The outlet for the bees is usually cut in the lower edge of the boxes, but I have found it much more convenient to have it formed by sinking the floor half of its thickness at the centre of its front edge. The width of the part sunk should be about four inches, and should gradually diminish in depth till it reach the centre of the board. The sloping direc-

tion thus given will, in case of beating rain or condensed steam falling upon it, prevent any wet from lodging within the hive. The floor must also be clamped at the ends, to prevent warping, though the superincumbent weight renders it less liable to be warped than the top. Either on the right or left-hand side of the entrance, as may be most convenient, a *groove* must be cut half an inch deep and half an inch wide; to this groove a *slide* must be fitted (made to run easily), for the purpose of closing the box, and preventing the egress or ingress of the bees, as occasion may require.



A *centre board* between each tier of boxes will likewise be convenient: it should be of the same size as the floor, and have an oblong hole about six inches by four in the middle, to give liberty to the bees to pass from box to box.

As the boxes and boards require to be made with great accuracy, that they may be nicely adapted to each other, a good joiner should be employed to construct them; for if there be any crevices the bees will, according to their invariable custom, fill them with propolis, and thereby waste their valuable time. The square boxes which I have described are the simplest of any, in their form: some persons prefer the octagonal or hexagonal form. In some situations, if windows be placed in the three posterior

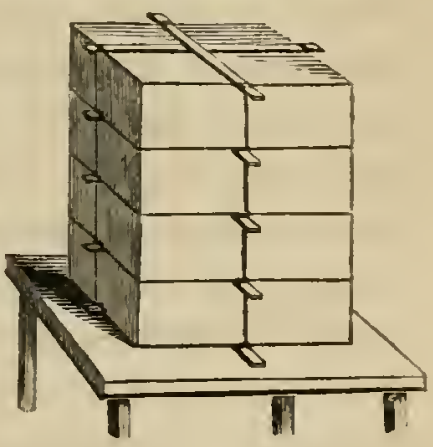
sides, those forms may be more convenient for exhibiting the operations of the bees, or the store of honey in the combs; but they are more expensive and more cumbrous, if made as capacious as the square ones; and these latter answer the intended purposes so well, as completely to satisfy those who have used them."

"A necessary appendage, as well to the hives as boxes, are *two brass plates*, of one-sixteenth of an inch thick as near as possible, fifteen inches wide, and fifteen and a half long, which half inch is to be turned upright, to pull it out by. They must be set on a true level. If they are thicker, the bees will escape on their introduction; and if thinner, they will not be strong enough to retain their necessary elasticity and level, but will bulge in the middle, and let the bees out." Mr. Keys proceeds to inform his readers that "Every apiator must be *feelingly* convinced of the difficulty and embarrassment of separating hives of bees, and in the other operations, by any of the methods made public. Indeed, by them the bees of *under* hives are prevented from assaulting the operator; yet those of the *upper* ones are left entirely free to execute their whole revenge.

By the use of the two plates, or *dividers*, and by doors to shut, this great danger and inconvenience are entirely avoided, as the bees of *both* hives are *equally* inclosed, and prevented from flying abroad and insulting the operator.

Doors to the hives and boxes will be found of great advantage on many occasions, particularly in passing the dividers under hives, to prevent the egress of the bees if the doorways are stopped, and on various other occasions.

We cannot pass on without giving a drawing and description of PALTEAU'S HIVE.



"Palteau's hive is composed of three or four frames, each a foot square, by three inches in height. The square frames are placed on each other, and the first and last can always be lifted without deranging the work in the third. Each square is strengthened on every side by a cross piece of eight or ten lines in width, and two lines in thickness, which serves to sustain the combs of the bees. All the frames are tied together by means of these cross pieces; a board is placed on the top; and a general cover is placed over the whole to guard it from the effects of the seasons. In autumn, when the honey is to be taken from this hive, the cross pieces are untied, and one or two of the upper frames are removed, passing the long blade of a knife or a wire between them. This done, an empty frame is placed above, and another under all the rest, which make up for the two removed. 'In an hour after,

says Bosc, who describes and recommends this hive, 'the bees are at work as if nothing had happened; and the same operation can be renewed to infinity.' "

On a careful examination of the pretensions of different writers, a description of the storifying process in the most favourable point of light has been brought under notice, in order that the systems of those who like the working of these hives in the simplest or most complex forms may be fairly represented, and that those who are beginning to keep bees may know all that has been done. Their great variety is enough to discourage; but if the hint given in the first chapter be attended to, the author thinks that one trial of an imperfect mode will not cause the study to be thrown up in disgust.

Dr. Reid says :—

" Every manufacturing art was invented by some one man, successfully improved and perfected by others; and when thus perfected, known only by those to whom it has been taught: while in the arts of animals no individual can claim the invention. Every animal of the species has equal skill from the beginning, without teaching, without experience, or habit."

Let the apiarian, therefore, recur to first principles, and if any hive he has adopted *forces* the bees *unnaturally* rather than *helps* them *naturally*, he may be certain of failure.

CHAPTER V.

THE PRINCIPLES OF STORIFYING EXAMINED.

If soul and body are once separated the man dies. If a city or a house be divided against itself it comes to desolation. And a kingdom divided against itself cannot stand.

Lord Bacon's great saying, that "Unity is strength," is a very apt introduction to this chapter; because we shall attempt to shew that the breeding part of a hive cannot be disturbed without positive loss, and that in proportion to the diminution of a stock of bees, will be its inability to survive the winter, or commence the spring well.

Every stock of bees, or colony, then, may be considered in this view, as a commonwealth; their habitation is in common, their labours all in common, their care of posterity in common, and they sympathize with one another in common danger, and with the greatest courage and resolution fight for each another.

In all the varied modifications of the class of hives, described in the two last chapters, *they have one*

principle in common, although of different shapes, and constructed with much ingenuity; they have no means by which the temperature of one part may be made to differ from another: so that, however great the credit which is due to those ingenious men who have improved the shape of the hive, and reduced the risk, yet the wreath cannot be placed on their brow for having produced a plain and simple hive, by which pure honey may be easily taken—the lives of bees preserved—swarming prevented—and their culture advantageously followed.

As we commenced our enquiry with the determination to give competitors for public favour the full advantage of their inventions, we will not invidiously draw comparisons between one man's labours and those of another, for the sake of shewing how clever we are at their expense; but endeavour to elucidate principles on which good practice may be founded. By Mr. Nutt's assistance a case may be plainly stated, which, while it tends more particularly to expose the fallacies *in one* sort of the storified hives, really settles the question respecting all. The reader is requested again to peruse the two former chapters, and he will find *all the hives therein described have the one character of an even temperature throughout;* on this depends the whole of Mr. Nutt's argument. He says:—

"My first objection to the piling system is—because it creates extra trouble, labour, and inconvenience to the bees, and consequently prevents their

collecting so much honey and wax as they will do when not subjected to these drawbacks.

But fairly to get at the merits—not to say demerits of this practice, I will examine it a little in detail. First, then, the storifying practitioner puts a swarm of bees into a box, which I will call box A. This box will be prosperous, and soon contain brood-comb, young brood, larvæ, and embryo bees in various stages of existence. If allowed to stand alone until nearly filled with the bees' works, another box (B) is placed upon it to prevent what is called the maiden swarm. This box, like box A, is also quickly filled with combs: the queen follows her labourers, and progressively lays her eggs in every part, which are soon hatched, and thus box B soon contains brood-comb like box A. The second box (B) is filled just as the first, like a cottage hive—not with pure honey, but with brood, pollen, or farina, and other substances mixed with honey; in short, there is no means of dividing the works of the working bees from the works of the queen bee; consequently the combs of both boxes are used indiscriminately for all the purposes of storing bee-bread or honey,—hatching young—and the queen is incessantly passing over the whole surface of the combs depositing eggs, so that the *whole interior* of the hive becomes one promiscuous mass. The eggs hatch, the brood continues to increase, and occupies that part of the box which should be for pure honey and wax. This goes on until more room is wanted; and then it is

that the two full boxes (A and B) are to be placed upon the third and last box (C). This, however, does not mend the matter, but occasions a great deal of additional labour and inconvenience to the bees: but nevertheless they construct new combs, and store some of the cells with honey, and the queen lays her eggs, just as in the other boxes. The fact is, the three boxes soon become as one: *they soon become and continue to be of one temperature*,—the same compound of the old hive,—the brood cells are intermixed with those containing honey,—wreaths of pollen are in every pile,—and animated nature is every where peeping from the waxen cells, in which nothing but pure honey ought to have been deposited.

But this is not all, though bad enough, if *purity of honey* be any consideration. It is a fact, known by every one at all experienced in the management of an apiary, that no sooner are the combs in box C in a state of forwardness than numbers of working bees are struck off their work there, and set about removing all superfluities and nuisances from the comb from which the young brood has just emerged in the uppermost box A. Every cell in those combs that has been the nest and nursery of a young bee they cleanse thoroughly and repair, preparatory to its being made a receptacle for honey. At this time, when the combs are free from the first brood, the uppermost box contains only *empty combs and bees, but little or no honey*. Here then the bees are subjected to that extra labour

and inconvenience which form my first objection to the piling plan. From the entrance into box C, through box B, and up into box A, the way, to a loaded bee, is neither short nor pleasant; it is a labyrinth, beset with difficulties and obstructions, in surmounting which much of that time is occupied which would otherwise be more profitably employed, in passing from flower to flower, to cull their sweets.

At length the time arrives to examine the three piled boxes, and when a part of the bees' treasure is to be taken as a remuneration for the *care* and trouble of the proprietor. Let him then put on his grotesque bee-dress, and booted up to the middle, and gloved to the very elbows, let him take the uppermost box. He divides it from box B by a slide or a divider prepared for such an operation.* He turns it up, but to his great disappointment, he finds that the combs are discoloured, that the cells in which he expected to find treasure contain young larvæ, and that there is much pollen intermixed with other substances; in short, the whole is dirty and filthy in appearance; and a part of the most valuable brood for another year has been destroyed. If, instead of the uppermost box, he takes that in the middle, he will in all probability destroy a greater quantity of brood: and in the lowest box he cannot expect to find more than half-filled, or even empty combs. Such are the fruits and profits of the storifying system of bee-management.

* Described at page 80.

How, I would ask, can the bees' sweet treasures be divided from their other work, if there are no means of varying and regulating the temperature in their hive? Without the aid of ventilation it is, in my opinion, impossible; but with it, it is perfectly easy and safe, and not at all unpleasant to the bees."

Such being THE FACTS OF THE CASE, let each one try for himself; and if, without ventilation, he can accomplish the four great desiderata mentioned at p. 84, by any of the storifying hives *for a series of three years*, we will endeavour to prove that one-fourth of the trouble, and one-fiftieth part of the risk in personal inconvenience from enraged bees, would have given a vastly superior produce, and much more pleasure.

We cannot close this examination without giving an abstract of Mr. Huish's opinion, who, though he sometimes deals too harshly with his opponents, we believe right in this matter. He says:—

"This storifying system has an influence not only on the quality, but the quantity of the honey. In the first place, on the quality, because the bees having stored up some pollen in the combs, when they were in the centre, and being able to extract it only imperfectly, the honey which is deposited in them, when that particular story becomes the upper one, contracts a bitterness of which it is difficult to deprive it: in regard to the quantity, because the capacity of the cells is diminished by the little film which every worm of the bee winds round itself, and

which it cannot wholly extricate from the cell. This is corroborated by Swammerdam, who, in his General History of Insects, says, that, 'in cutting some cells, the basis is found to be about the thickness of a shilling, whilst in general it is extremely thin. This arises from many films being placed one above the other.' Maraldi observed, during one summer, that the cells served five times for the brood of bees: therefore, in one season, five films were placed on one another."

Mr. Huish continues, "By the use of the storied hives, it is also said the invasion of the moth is prevented. I have, however, seen a storified hive, or colony, the combs of which were devoured by the moth, not from the negligence of the proprietor, but because there being neither brood nor queen, and the hive being in fact in a sterile state, the bees were deprived of all defence; the invasion of the moth in the disorganized hives, of whatever form they may be, is so rapid in the month of August, on account of the heat, that it is only to be perceived by a strict and daily attention.

Another advantage of this system is said to be the facility with which artificial swarms are made with the stories taken from the centre, which in the season bordering on that of the swarms, ought to contain the cells of the young queens, or at least the brood from which the working bees would know how to raise themselves a queen. I merely observe that it is not an easy operation to take the stories full of

brood; it is an actual siege against the fury of the bees.

Another great inconvenience arises from the diminutive elevation of the stories, each of which is separated, and obliges the bees to live, as it were, in different families, whereas their own preservation, and that of the brood, necessitates them to live in the strictest union. According to this method, there would be one cluster in one story, another in the second, and so on; by which the *interior heat* being only in proportion to the partial junctions, would not produce the same advantageous results as if there were no points of division.

I once saw an amateur, who attempted to remedy this inconvenience, by making on each separation holes of fifteen lines in diameter, very near each other; but he found that the holes embarrassed him very much, when he came to take off the upper stories.

Another inconvenience is the cutting across of the combs with the wire to separate the stories, they being placed at the lower part, to be taken away when they have attained the top. In crossing the centre, the queen has deposited her eggs in it, the brood having formed a film, which remains waxed to the sides of the cells: when the story is to be raised, the films resist the wire, and, before they will yield, the combs fall upon each other, the bees are crushed, and amongst them, perhaps, the queen. This inconvenience can be remedied, it is said, by

cutting the combs at the sides; but then the particular direction of the combs must be distinctly ascertained, *which is not an easy matter*, as there are some which are crooked. Besides, I have attempted to cut the combs at the side, and I discovered that the film prevented a clean incision."

So much has been written on this subject, as well condemnatory as applauding, that, as this work is intended as a practical apiarian's vade mecum, we must close our remarks. We think if the principle of ventilation be established and admitted into use, the storifying principle must be thrown into the shade; for by the former the management of bees is reduced as much to a system as the feeding of sheep or any other rural occupation.

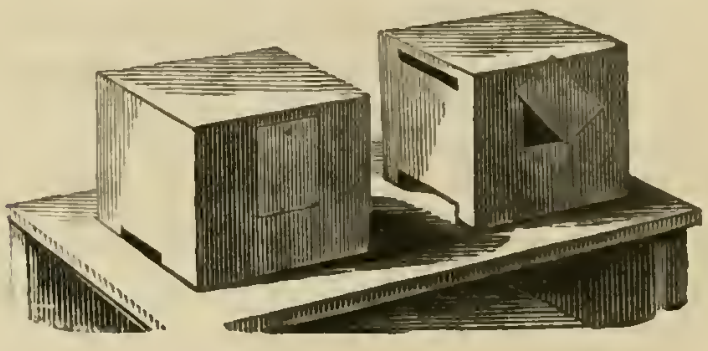
CHAPTER VI.

ON COLLATERAL BEE BOXES.

"Deem not, vain mortal, that reserved for thee
Hangs all the ripening fruit on reason's tree."

The two last chapters were devoted to the description and examination of piling or storifying hives, be the dimensions or materials what they may; and an enquiry into the causes why the system had not accomplished its great ends. Ease of management, and a good supply of pure honey, are unquestionably important. We now proceed to describe a further improvement; which, without multiplying remarks, we set before our readers in

Mr. White's Hive.



This hive was invented by the Rev. Stephen White, of Holton, in Suffolk, who published a pamphlet, which passed through a first and second edition, entitled, "Collateral Bee Boxes; or, a new, easy, and advantageous method of managing bees, in which part of the honey is taken away in an easy manner, without destroying or much disturbing the bees: early swarms, if desired, are encouraged; and late ones prevented. By Stephen White, Holton, Suffolk. London, 1756, 8vo., 1*s.* 6*d.* Second edition, London, 1763, 1*s.* 6*d.*" This work is very scarce,* perhaps owing to its pamphlet form; but as Mr. Huish, in his larger work, has given a full description, we hesitate not to extract from it.

"In Mr. White's directions for making the bee-boxes of his own invention, and regarding the manner of constructing a single one, he says that it may be made of deal or any other well-seasoned boards, which are not apt to warp or split. The boards should be nearly an inch thick, the figure of the box square, and its height and breadth nine inches, and five-eighths every way, measuring within. With these dimensions it will contain nearly a peck and a half of bees. The front part must have a door cut in the middle of the bottom edge, three inches wide, and nearly half an inch in depth, which

* Should any of his readers possess Mr. White's pamphlet, the author would feel obliged by a perusal, or permission to purchase, if he should have not already met with a copy.

will give free liberty to the bees to pass through, and yet not be large enough for their enemy, the mouse, to enter.

In the back part, a hole must be cut, with a rabbet in it, in which a pane of the best and clearest crown glass must be fixed about five inches in height, and three in breadth, and fastened with putty; the top of the glass must be placed as high as the roof within side, that the upper part of the combs may be seen, where the bees with their riches are mostly placed. By these means, a better judgment will be formed of their state and strength, than if the glass were fixed in the middle; the glass must be covered with another piece of board by way of shutter, which may be made to hang by a string, or turn upon a nail, or slide sideways between two mouldings.

The side of the box which is to be joined to another of the same form and dimensions, as it will not be exposed to the external air, may be made of a piece of split deal not half an inch thick: this is called the side of communication: a space is to be left at the bottom, the whole breadth of the box and a little more than an inch in height, and a hole or passage is to be made at the top three inches long, and more than half an inch wide; through these the bees may pass from one box to the other: the lower communication being on the floor, the bees with their burthens may readily and easily

ascend into either of the boxes; the upper communication is only intended as a passage between the boxes, resembling the little holes or narrow passes which may be observed in the combs formed by the bees, to save time and shorten the way, when they have occasion to pass from one comb to another; just as in populous cities, there are narrow lanes and alleys passing transversely from one large street to another.

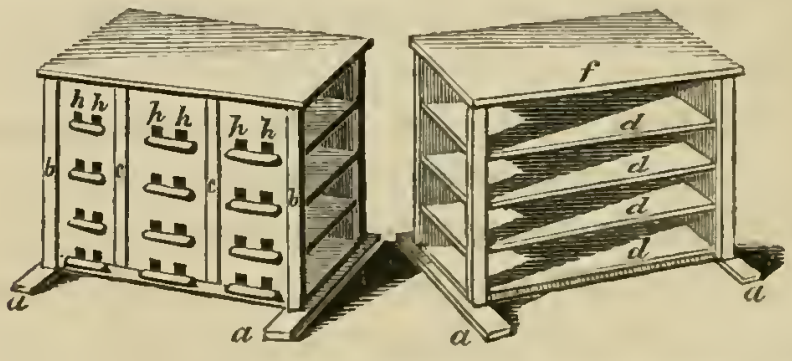
In the next place a loose board must be provided, half an inch thick, and large enough to cover the side where the communications have been made; several little iron staples must be kept in readiness an inch and a half long, with two points or ends bent down more than half an inch."

Mr. Huish has not extracted this last paragraph very clearly, inasmuch as the use to which this loose board and the iron staples are to be applied is not shewn: not possessing Mr. White's book, we can only conjecture that the loose board is intended to be placed against the side of the box, which is left on the stand, when one of them has been taken off to be emptied of comb—and that the staples should rather have been denominated iron *clamps*, which, by having a hook at each end, embrace the box and loose board, and thus temporarily close the communication until the emptied box is returned.

"No directions are necessary for making the other box, which must be of the same form and dimensions. The two boxes differ from each other

only in this respect, that the side of communication of the one must be on your right hand; of the other on your left. The cut at page 92 represents two of these boxes, with their openings of communication ready to join to each other.

He then gives the two following drawings of the place in which he proposes to deposit these boxes:



that on the left represents the front of a frame for twelve colonies; *a a* are two sills of oak lying flat on the ground, more than four feet long. In these sills four oaken posts are to be fixed. The two posts, *b b*, in the front, are about six feet two inches above the sills, the other two standing backwards, five feet eight inches.

Some boards of split deal must be next nailed horizontally from one of the fore-posts to the other, to screen the bees from the sun: these boards must be seven feet seven inches in length, and nailed to the inside of the posts, and be well seasoned, that they may not shrink or gape in the joints. *c c* are two splints of deal to keep the boards even and strengthen them.

While that on the right represents the back of the

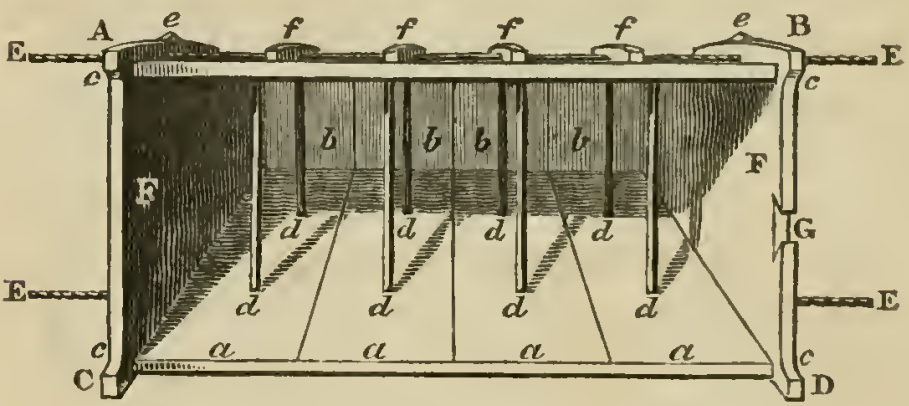
frame, *d d d d* are four strong boards of the same length with the frame, on which the boxes are to be placed; let the upper side of them be very smooth and even, that the boxes may stand perfectly even; or it may be still more advisable to place under every pair of boxes a smooth thin board, as long as the boxes and about a quarter of an inch wider: the bees will soon fasten the boxes to this board in such a manner that you may move or weigh the boxes and board together, without breaking the wax, which for many reasons ought to be avoided. These floors must be supported by pieces of wood or bearers, *e e*, which are nailed from post to post at each end. They are likewise to be well nailed to the frame, to keep them from sinking with the weight of the boxes: *f* represents the roof which projects backwards about seven or eight inches beyond the boxes, to shelter them from the rain.

Niches or holes must now be cut in the frame, over against each mouth or entrance into the boxes, at *hh hh hh* in the left-hand cut. These niches must be four inches long, and under each a small piece of wood must be nailed for the bees to alight upon, with a slope downwards to throw off the rain from the hive.

The morning or evening sun will shine upon one or both ends of the frame, let its aspect be what it will; but it may be prevented from overheating the boxes if a loose board be set up between the posts, and kept in by two or three pegs." From Mr. Huish's

work we also copy an elaborate description of another ingeniously contrived invention :—

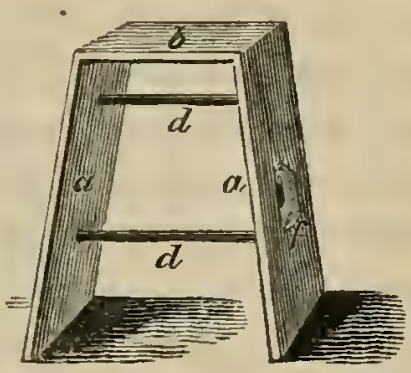
" Mad. Vicat, a native of Switzerland, has contributed very largely to the knowledge of the natural history of the bee, and having observed great inconvenience attending the use of boxes or hives, which are placed on one another, she contrived a hive formed of collateral boxes, and the construction of which appears to Mr. Huish to be very simple.

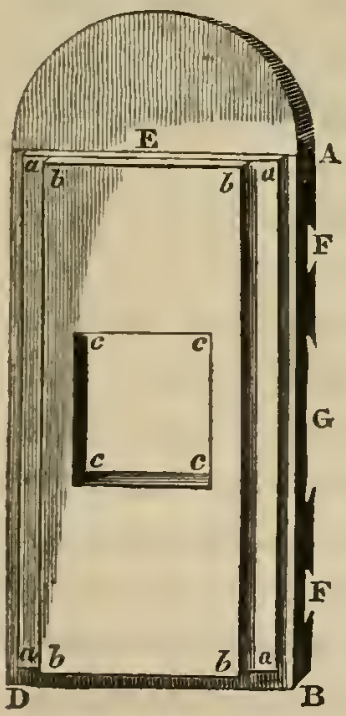


This cut represents the inside of the hive composed of its four boxes put together, laid on their sides, *a a ;* E E are rods with screws, which serve to connect the boxes of the hive; F F mark the front and back of the hive; G the entrance in the fore part of the hive; *b b* are the bottoms of the boxes seen in their insides, but are really the tops, as they stand in the hive; *c c* are notches which serve to fasten the hive to the ledge of the table; *d d d d* are the rods destined to support the combs : these rods are eight in number, two to each box, which they traverse breadthwise; *e e* are two screw nuts

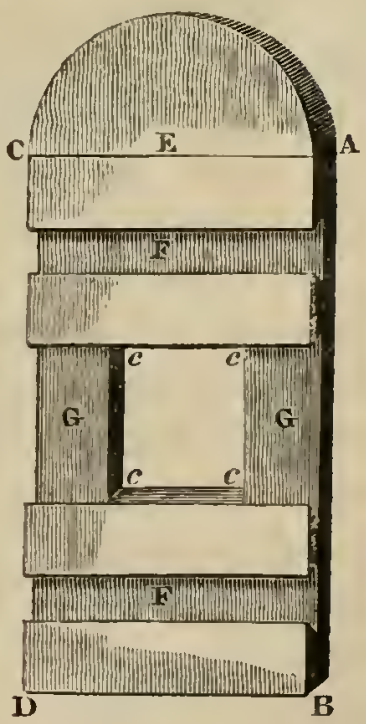
moveable along the rods E E, and which serve to fasten the boxes (more or less) closely to each other; *f f* are the wooden rings through which the screw-rods pass.

This figure represents one of the boxes separated from the hive; it shews the same parts marked with the same letters as at page 98, namely *a a* the sides, *b* the top, *d d* the rods, and *f* the ring of the box.





This cut shews the table of the hive *seen from above;* E is the fore

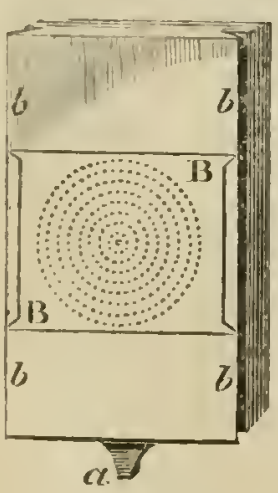


This represents the *under surface* of the table; E is the fore part of

part; F F are the hollows made in the under side of the table to receive the legs, which are nailed to it. G, a groove to receive the sliding drawer of the table, represented in the next drawing; *b b*, ledges which enter into the notches, *c c*, (*See* p. 98;) *a a*, ledges, which fix the cover represented at p. 101; *c c*, is the opening made in the table of the hive, in order to its being cleaned by means of the drawer.

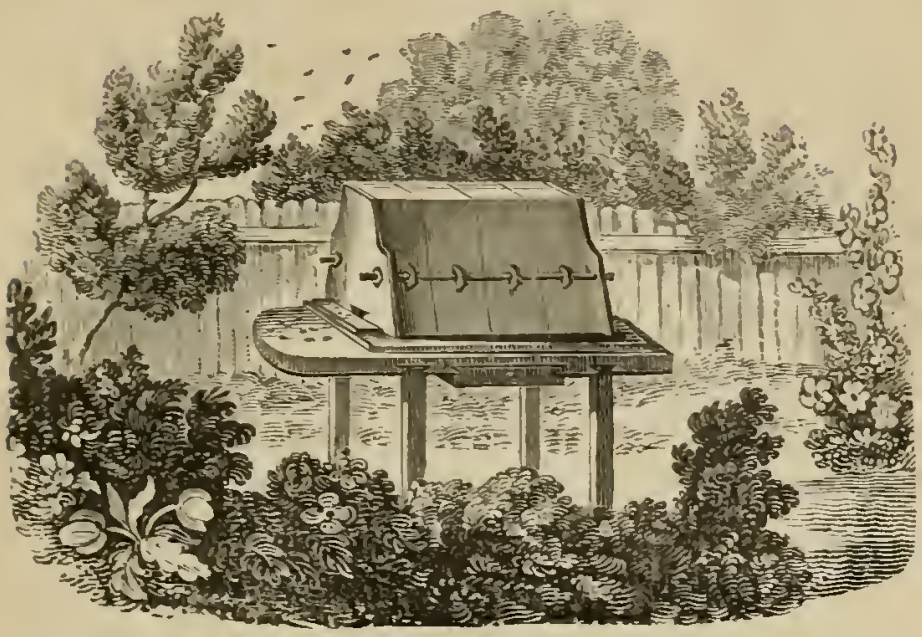
it. F F are the hollows of the other figure. G is likewise the same groove as that which is there figured, and *c c* the opening in the table of the hive, communicating with the drawer, next figured, which also presents the advantage of a safe and easy method of feeding the bees without exposing them to the cold: without a full supply of food, especially if casts, you cannot expect your bees to get on well.

The DRAWER of the table; B B is a linen slider intended to let air in at the bottom of the hive; *a* is the handle of the drawer; *b b* are the ledges which serve to secure it in the groove G of the two cuts at p. 99, where the *under* and *upper* surfaces of the table are shewn.



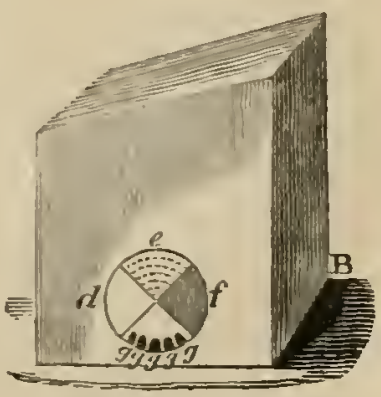
The following cut represents

MADAME VICAT'S ENTIRE HIVE.



This hive is composed of its four boxes, as seen above, screwed fast together, but without the addition of the cover, figured at the foot of the page. The drawer is here seen in its proper situation under the table; while the front part of the hive may be known by the bees at the door-way.

The annexed drawing is the cover with its moveable circle, in which the part *e* is pierced with holes; *f* is quite open; *g g g g g* are five little arched openings for the passage of the bees, and the close part *d* is to shut the openings



entirely, when the weather is too cold for the bees. the screw rods should not be made to project on each side of the hive so much as in the first drawing in p. 98; but they should be as seen in the drawing of the entire hive, where they are fastened behind by means of an iron rod.

When one of these hives or colonies is first peopled, the upper piece, or top of one of the boxes, is taken off, and the straw hive is placed upon the opening, putting a grate of wire on the hole, to prevent a union of the combs in the box with those in the hive, which would render the separation more difficult.

When a box is to be taken away, the rod, which holds the boxes firmly connected, is unscrewed. Those which are intended to remain must be kept steady by staples. The opening in the bottom of the piece of deal, which forms the back part of the hive, is then to be opened, and the smoke of linen rags is blown into the box: as soon as a judgment can be formed that the bees are by these means driven out of the farthest box, the end is loosened and taken away; then the box itself is loosened from the next, and the combs, if they run in a longitudinal direction, must be cut through with a wire, or a sharp thin knife: if the combs run crosswise, they must be taken out singly before the box is taken away. The box being then removed, the piece of deal forming the back of the hive is immediately joined to the remaining box, and secured as it was

before. The smoke should be kept up all the time, to prevent interruption from the bees. If the first box is to be taken away, the same steps are to be exactly pursued, and if it be done when most of the bees are abroad, scarcely a bee will be lost.

The Hive of Gelieu is composed of boards of an inch in thickness at least. It is of an oblong form, a foot in height, nine or ten inches broad, and fifteen or eighteen long. This species of box, open underneath, is closed only by the table on which it stands; the entrance of the bees is at the bottom of one of the great sides. This square, thus constructed, is divided from the top to the bottom, in order to make two equal parts, in such a manner that the door at which the bees enter is cut in two; the open slides are closed by two light boards; in each of these two last planks two openings are made, viz., one in the centre of three or four inches, for the communication of the bees from one part to another, and the other at the bottom, like that of the entrance, by which the bees can communicate from one part to the other by the openings at the centre, and those at the bottom. These two demi-hives are kept united by means of eight projecting pegs, two of which placed on each side, top and bottom, in the thickness of the boards, enable the apiarian to attach an iron wire from one peg to the other, which prevents the separation of the two demi-hives.

This species of hive presents the facility of making artificial swarms, by dividing at a proper time, and

adding to each demi-hive two empty parallel portions; but I do not believe that the deprivation of honey from them is easy without extracting the brood on that side from which the honey is taken."

In our fifth chapter the storifying system was examined, and the cause of failure traced up to the want of ventilation; *these* collateral boxes are subject to most of the inconveniences of the storifying principle for the same reason, and have failed to get into common use, because the outlay has not been met by results equal to those promised by the projectors. These collateral boxes are a little improvement on their predecessors; but still the impracticability of giving COOL apartments is so fatal to them, that the new method of taking the honey will not be a sufficient inducement to get them into public notice and use.

In a subsequent chapter the principle of ventilation is treated upon, which the reader is requested to peruse; and then he perhaps will admit, that however modified a hive may be—or however fanciful—or *however common*, if it does not possess the means of adding COOL *store-room*, it will fail in practice. Man must not attempt to prescribe laws to his Maker, nor to the works of his Maker. Let him study the character and habits of his bees; and if he would profit by such study throw aside all his preconceived opinions, and he will assuredly arrive at the conclusion that the immense numbers of bees which are hatched and reared in a healthy hive

must require increased room; and that, while a queen lays only a certain number of eggs, which may be reared in one apartment, honey may be stored to any extent, so long as the queen is fruitful to produce workers, the season continues, and the bees have room to put it away.

Ventilation alone is necessary to keep the breeding queen out of the store-houses.

One fact the author assures his readers,—that the nearer the simple course of nature is followed, the more will they be led to admire the wonder-working hand which controls all the movements of the vast machinery of animated nature, and adore the Almighty power which, while it guides a sparrow, wings an angel.

CHAPTER VII.

THE HIVE OF HUISH DESCRIBED.

" Prone to revenge, the bees, a wrathful race,
When once provoked, assault the aggressor's face ;
Their latent stings an easy passage find,
And wounding, leave their 'foolish' souls behind."

Most bee-masters fancy themselves to be very courageous—and that few have done such feats as they have—and fewer still dare attempt them. No doubt Mr. Huish expects that all his readers may be as courageous as a practical apiarian if they will but try; he therefore presents his own hive to their notice. We follow his example in his own words, and beg our readers to remember that we conceive Mr. Huish's hive to be only *experimental*, suited to those who wish to prove what it is to be thoroughly stung wherever the bees can find a piece of exposed flesh.

The hive is so dissimilar to all others that we have described it here in a separate chapter; and whether an improvement or not we leave for those to judge who have tried, or dare try its merits. Mr. Huish says :—

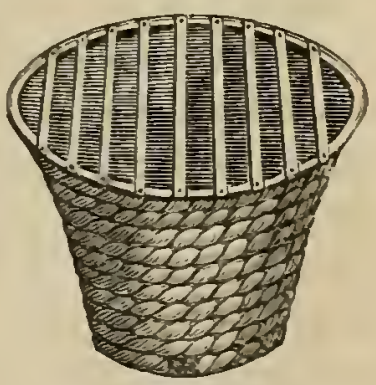
"As it has always been my invariable study to save the lives of bees, and at the same time to reap the utmost possible profit from their labours, the selection of a proper abode for them was a matter of no secondary consideration; for on this must depend the degree of success in the undertaking. Aware of the several disadvantages which are conspicuous in the construction of the various kinds of hives that are in general use, I considered it possible to erect one on those principles which would obviate every disadvantage, and at the same time combine beauty with utility.

My first object was to select those materials which I judged most suitable for the construction of a hive, and after repeated experiments on the various materials, I was convinced that no one was more proper than straw. This I know is denied by Huber; but I must be allowed, in this instance, to differ from that celebrated apiarian. The shape of the hive was my next consideration. I had been so often defeated in my expectations, regarding the deprivation of the common straw hive, and especially by the sticks, with which they are superfluously furnished, to prevent the combs from falling, that I was persuaded it was a shape fitted only for those persons who suffocate their bees; but to the partial deprivator, it was the most inconvenient and unmanageable form that could be suggested. A flower-pot first suggested an idea of the shape, which appeared to possess peculiar advantages. It

would, in the first place, supersede the necessity of sticks; for the combs, then acting like a wedge, being larger at the top than at bottom, could not fall on the board. Thus one great difficulty was overcome; but then the impossibility of extracting the combs from the bottom of the hive presented itself; for upon the same principle, that the combs acting as a wedge would prevent them falling down, so it would be impossible to extract them from the bottom, as they would be smaller there than at the top. One only method therefore presented itself of extracting the combs, and this was from the top; but this I knew could not be effected, were the combs to be all constructed on one basis, which is the case in the generality of hives. I therefore set my invention to work to devise a method by which each comb could have its separate foundation; but I was aware of the perverse and untractable temper of the insects under my management, and that from the very spirit of opposition which, were I inclined to be severe, I might say arises from their being under the government of a female,* they would not construct their combs in the particular manner consonant to my wishes. I had tried a hive on the principal of Huber, and found that, notwithstanding the scientific and philosophical elucidation of Mr. John Hunter, that an edge forming a salient or even a returning angle, determined the foundation of the

* This is not very gallant on the part of Mr. Huish.

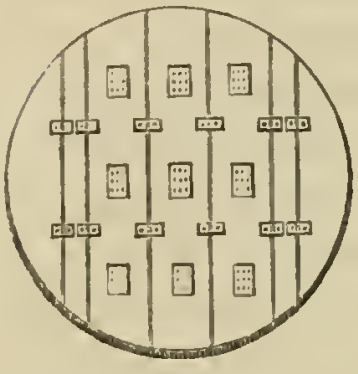
combs of the bees, they had nevertheless disregarded this principle, and had worked in the interstices between the frames. To give to each comb its own foundation was not a matter of any great difficulty; but in what manner the bees were to be prevented from working in the interstices, and at the same time, to be forced to work on the foundation prescribed to them, cost me some little pains to determine. It suggested itself to me that a bee will never work on an unstable foundation, and therefore I considered that I should succeed in my design, if I could insert some net-work between the pieces of wood. Having obtained nine pieces of well-seasoned wood, about one and a half inch broad, and a quarter of an inch thick, I laid them equi-distant on the top of the hive, and having fastened them to the outer projecting band, which serves as their basis, I covered them with net-work, over which I placed a circular board the whole size of the hive. In this circular board, a very great improvement has suggested itself.



As the bees always reside at the top of the hives, I found that on taking off the board, the whole of the bees became exposed, and the difficulty of deprivation was thereby considerably increased. I judged it therefore expedient to devise some method by which the side combs could be extracted without exposing

the middle of the hive to the light, and the deprivation could be then effected without the knowledge of the bees.*

I therefore divided the circular board into five† separate pieces, which are attached to each other by small hinges: each individual one can then be opened as occasion may require. Were the bees to attempt to fasten their combs in the interstices, they would find the net-work, which, being a moveable foundation, would oblige them to construct the combs on the single boards; I had, however, now given to my hive a flat top, which I knew was injurious to my bees, as it prevented the evaporation of the steam arising from their bodies. To obviate this I made nine holes in the circular board, which was placed upon the net, and which I closed with plates of tin perforated with small holes. The whole I covered with a convex cover of straw, manufactured in the same manner as the hive; the form in the interior facilitates the flowing of the vapours down the sides of the hive, while the form of the



* In the opposite page we read of some of the bees who were "foolish enough" to find out Mr. Huish, and leave their stings behind them.

† We have made an exact copy of Mr. Huish's description and drawing, but our readers will see the discrepancy of five bars in the description, while there are seven in the drawing.

exterior prevents any rain from lodging on it. This cover is well plastered down to prevent the admission of any light into the hive. At any time and season, when I require some honey-comb, or at the end of the season, when I deprive my bees of their superfluous store, I open the top and take the side boards out, from which having cut the honey-comb, I replace them in the hive, and the operation is facilitated by having some vacant boards ready to supply the places of the full ones.

This operation is very easily and speedily performed!!!! it has the advantage of not disturbing the middle combs, and I have often deprived these hives of their honey without the loss of a single bee, excepting those few who were *foolish enough* to leave their stings in various parts of my dress.

This cut represents one of the horizontal boards, extracted from the hive, with the comb pendant from it. Two very considerable advantages arise from the use of this hive:—In the first place, there is never any occasion to make an addition to the hive at the bottom, when the bees, by hanging out in clusters, declare that they stand in need of room; for the operation of depriving them of a part of their combs, from the top, will give them

the room which they require, and which they will soon replenish with honey. In the common hive, it is customary, in this predicament, to place what is called in Scotland an eke, (*See* p. 62,) which consists of from four to six bands of the same diameter as the hive; but, on taking away this eke in the autumn, I have seen the most injurious consequences result to the hive. It is in general performed by cutting the combs with a wire between the hive and the eke, and then, whilst one person lifts up the hive, another draws the eke away: the hive then rests on the stool. Few persons, however, consider that, as the combs are cut parallel with the bottom of the hive, they will all touch the stool on which it stands, and I have thus known a whole hive perish.*

The second advantage is, that the whole of the interior of the hive is open to your inspection, and you are thus enabled to examine the devastation of the moth, or to ascertain the presence of any other enemy."

This is Mr. Huish's own description of his own hive, to which may be added, that Dr. Bevan, in speaking of this hive, says, "*The principle appears to be very good, but I doubt whether it will come into general use*; for as bees are *not very tractable creatures*, they are not likely to construct their combs in direct lines, so as to attach one singly to

* This inconvenience may be easily obviated by having a single-band eke ready to support the hive after the larger one as been taken away.

each of Mr. Huish's bars; the tops of the boxes which I use are constructed like Huish's, yet I never saw an instance in which the combs did not either cross those bars at right angles, or connect themselves in some way or other with two or three bars, so as to render it impracticable to remove a comb or two from the outsides, in the manner that Huish proposes ! ! ! The sole advantage of Huish's hive consists in this undisturbing mode of removal; and, *could it be effected,* honey might be extracted without withdrawing any of the stored pollen or propolis, or molesting the brood in the centre combs; *an inconvenience which, it must be admitted, may be charged upon* the storifying system.

Huish, in the instructions for using his hives, admits the difficulty which I have here stated, as to the attachment of a single comb to more than one bar, and gives particular directions how to proceed on such occasions; but even under tolerably favourable circumstances, the recommended operation would require considerable nicety, and no small portion of courage; in some cases the difficulty would be completely insurmountable."

Comment is useless after Dr. Bevan's opinion—for, as he admits the principle to be good, it is certain he would have praised the working of the theory if he could.

We will conclude this chapter by relating an anecdote of a late celebrated physician.

" Dr. M——, having the charge of an extensive

lunatic establishment, went one day to the top of the asylum, to visit the unfortunate inmates, where a promenade was enclosed by a railing to accommodate them. He had hardly stepped into the open air, when one of the patients closed the door behind him, and in a serious style addressed the doctor:—'Well, doctor, we have been consulting together, and we have come to the determination to request you will only just jump down into the yard below, that we may see how you do it.' The doctor's presence of mind did not leave him, and in a moment he replied, 'No bad thought, the plan is excellent,—but I know a better—any fool can jump down, but I can jump up. After I have done that feat, I am sure I can do the other.' "

Applying the anecdote, we say the plan is excellent to take off the lid; but we know a better,—let it alone. Any one can eat the honey *after* it is taken from Mr. Huish's hive, but who will lift up the cap of a hive in working order, and take out a comb or two covered with bees? Let the reader jump up and its certain he can jump down.

CHAPTER VIII.

ON SWARMS.

"See where, with hurried step, th' impassion'd throng
Pace o'er the hive, and seem with plaintive song
T' invite their loitering queen; now range the floor,
And hang in cluster'd columns from the door;
Or now in restless rings around they fly,
Nor spoil they sip, nor load the hollow'd thigh:
E'en the dull drone his wonted ease gives o'er,
Flaps the unwieldy wing, and longs to soar."—*Evans.*

In the former part of this work, when treating upon the cottage hive, the inconvenience of not having *cool* store-room was just named, and the reader was referred to this chapter for an elucidation of the principles on which swarming depends. To make the matter as clear as possible—as a separate principle—and also to shew how far swarming is necessary, we intend to discuss the subject in five sections:—1st, In its causes; 2nd, In the indications of swarming; 3rd, In the management of swarms; 4th, In the relative value of swarms and casts; and 5th, In the weakening influence which swarming has upon a colony.

SECTION I.—CAUSES OF SWARMING.

Every one is ready to admit that the greater the number of persons crowded into a room the greater is the heat; that the inconvenience increases in a very great degree according to the length of time in which such apartment is occupied; and that the more sultry the atmosphere is at the time the greater difficulty is there to give a supply of fresh air: but allow one of the upper windows of the room to be opened and immediately the exhausted air escapes, and a supply of vital air is introduced through the open door-way. To apply these plain remarks, it is scarcely necessary to shew that the heat of the interior of a hive is increased in exact proportion to the number of its inhabitants; and that, until the hive be relieved, by losing part of its population, the heat cannot be reduced.

That indefatigable naturalist, M. Huber, has entered most minutely into the history of the queen bee; but as we have given a general history in Section 1. of Chapter II. we purposely omit it here, but take M. Huber's result: he says, "We have frequently proved the heat of the hive by the thermometer. In a populous hive the heat continues nearly of one temperature until the tumult which precedes swarming, which increases the heat to such a degree as to be intolerable to the bees. When exposed to it they rush impetuously towards the outlet of the hive, and depart." Kirby and Spence,

whose work has been quoted before, say, " Bees being confined to a given space, which they possess not the means of enlarging,—to avoid the ill effects of being too much crowded, when their population exceeds a certain limit, they must necessarily emigrate." This is a fact which cannot be denied ; and the very heat of the hives is such as to incite the queen to lay, and mature the eggs. What can be done in such a case ? The fact is undeniable that adding glasses to a common box will not answer, because the temperature is only partly reduced for a very short time. We answer, Nothing can be done, —swarm they must, and swarm they will. Whether the increased population makes the hive too hot for the queen, and thus drives her to desperation—or whether, as in M. Huber's hypothesis, the queen has the means of agitating the bees, even to delirium, we leave for the researches of our entomological readers. It is enough for us to know, that before swarming a thermometer introduced into a hive stood at 120°, while *the day after the swarm*, when many bees had gone off with the swarm, the glass stood only at 97°. We think, therefore, that the cause of swarming is a suffocating heat in the hive which drives out the old queen, who has just finished her *great laying of eggs*, and is consequently light to lead a swarm. Keys says, " Stocks single hived, on being filled, and having young queens, will often swarm repeatedly, though of small bulk ; by reason that, having no more space to work in, they would

rather swarm than be idle, that the precious advantage of honey-gathering may not be lost." He adds, "It must be considered, that, when the combs of a hive are full of honey and brood, the spaces left between being only half an inch in width each, contain only a third part of the capacity of the whole hive, and consequently, by a *forward queen, soon become overcharged.*" Hence want of room may be considered another cause for swarming. Huber has lucidly proved this fact to demonstration; he chose the month of May, and divided eighteen hives into two portions: all the queens were about a year old. Thus each portion of the hives had but half of the bees that were originally there. Eighteen halves wanted queens;—but the other eighteen had very fertile ones,—which soon began to lay the eggs of males; but, *the bees being few*, did not construct royal cells, and none of the hives threw a swarm. Therefore, if the hive containing the old queen is not very populous, she remains in it until the subsequent spring; and if the population is then sufficient, royal cells will be constructed: the queen will begin to lay male eggs, and after depositing them, will issue forth at the head of a colony before the young queens are fully matured. What can be more conclusive,—the eighteen hives, with the old queens, possessed every requisite for swarming, and yet did not swarm? We apprehend, because M. Huber took away half the population from each hive and with them half the

combs; so that the cause of excessive heat in the apartment was taken away, and the apartment itself, in effect, increased by having the combs taken away, although the outside diameter was not extended.

Another proof may be stated, which, while it was differently worked, produced equally sure grounds to draw the conclusion, that bees swarm because they are over-heated and have not room. Huber, in the course of his experiment to ascertain how many queens he could force his bees to provide, destroyed the oldest directly she left the hive with a swarm, which caused the whole of them to return back again, having lost their leader. Their return produced the desired effect; in a very short time the interior heat of the hive was increased to so great an extent, that another swarm, as large as the first, in fact that very swarm, issued again from the hive; this queen he also destroyed: the bees returned, re-produced the inconvenience, and swarmed again, and so on, until, after six unsuccessful attempts, and the destruction of six queens, the seventh rose so unexpectedly, and so impetuously, that even the indefatigable Huber lost his prize, and had only the satisfaction of seeing them depart at a vast height in the air. After this swarm left, a small cast was thrown off—the season was lost; but a fact was proved.

The inferences are plain: it is not a desire of roving which induces a swarm, but self-preservation; and though a leader may be destroyed six

different times, the annoyance in the hive will force them off.

Another fact is curious: many people have supposed that the hanging and clustering of bees is sheer idleness, and that if such idle fellows could be got rid of the better. Such persons are ignorant of the fact, that while bees are thus clustering inside a newly stocked hive, which of course can only be seen when windows are introduced, they are commencing combs; and whether they are making an artificial heat to warm the wax, while those inside the cluster work and knead it up—or whether it is the ordination of God, that the bees shall so cluster or rather hang one on each other, to enable their fellows to disengage the plates of wax from between the rings of their body, it is difficult to ascertain; but the clustering as certainly precedes a new comb as eggs produce bees. Apply the following remark:—when bees swarm they cluster precisely in the same manner when at rest as when constructing new comb *within* the hive, and actually begin to make their combs, although in a situation quite unprotected. What can this teach us, but that the cause of their leaving their hive was its inconvenient size—that they had no place to build new cells and disgorge their bodies of wax?

The pellets seen on the legs of bees is bee-food, not wax: wax is formed within the body and passes therefrom in small white plates from between the rings of the abdomen.

Take another instance: Mr. Keys had a box which had swarmed, but from which the bees afterwards laid out, notwithstanding as many glass hives were set over them as amounted to a peck; *much work being done in the glasses*, he did not choose to take them off, and therefore screwed on a little box over the cluster and the door-way, having a fresh door-way made therein. The bees built in that box, and were found to have succeeded well, when taken away as soon as honey-gathering ceased.

To which we add the testimony of Huish, "that a great number of bees in a small space, having their natural heat augmented by that of the atmosphere, obliges the swarms to abandon their mother-hive either sooner or later."

Having presented these remarks to our readers, we urge them to think them well over, as much of the ease of management of the new ventilating hives hereafter to be described will depend thereon. Common sense must go to work.

SECTION II.—INDICATIONS OF SWARMING.

Having, in the former section, given an opinion on the causes of swarming, we proceed to collect a few out of the many signs by which that extraordinary effort of nature is preceded; so that the uninitiated may know when to expect some apiarian employ.

The symptom of clustering, or hanging out, if taken singly, may be regarded as fallacious; but

when conjoined with other indications it may be considered as a sign of swarming. It does certainly indicate that there are bees sufficient to throw off a swarm, and is sometimes evidence of an anxiety to do so: but unless there be a queen ready to go off with them, *however distressed for room*, the clustering will sometimes continue for a considerable time: in hot, dry seasons it may last till the end of August.

"Another indubitable sign," says Reaumur, "is, when on a sunny morning, the weather being favourable to their labours, few bees go out of a hive, from which, on the preceding day, they had issued in great numbers, and little pollen is collected. This circumstance," he observes, "must be very embarrassing to one who attempts to explain all their proceedings upon principles purely mechanical. Does it not prove," he asks, "that all the inhabitants of the hive, or almost all, are aware of a project that will not be put into execution before noon, or some hours later? For why should bees, who worked the day before with so much activity, cease their labours in a habitation which they are to quit at noon, were they not aware that they should soon abandon it? The appearance of the males, and the clustering of the population at the mouth of the hive, (though this last is less to be relied upon, being often occasioned by extreme heat,) are also indications of the approval of this event. A great deal depends, however, on the warmth of the atmosphere and the state of the weather either to accelerate or

retard it. Another sign is a general hum in the evening, which is continued even during the night,—all seem to be in a bustle, and the greatest restlessness agitates the bees. Sometimes to hear this hum the ear must be placed close to the hive, when clear and sharp sounds may be distinguished, which appear to be produced by the vibration of the wings of a single bee. This hum by some has been gravely construed into an harangue of the queen to animate her subjects to the great undertaking which she now meditates—the foundation of a new empire. Events sometimes seem to happen very suddenly amongst them which put all the bees in motion, for which no account can be given. If you observe a hive with attention, you may often remain a long time and hear only a slight murmur, and then, all in a moment, a sonorous hum will be excited, and the workers, as if seized with a panic terror, may be seen quitting their various labours, and running off in different directions. At these moments, if a young queen goes out, she will be followed by a numerous troop."

Huber has given a very lively and interesting account of the interior proceedings of the hive on this occasion. "The queen, as soon as she began to exhibit signs of agitation, no longer laid her eggs with order as before, but irregularly, as if she did not know what she was about. She ran over the bees in her way; they, in their terror, struck her

with their antennæ, and mounted upon her back; none offered her honey, but she helped herself to it from the cells in her path. The usual homage of a court attending round her was no longer paid. Those, however, that were excited by her motions followed her, rousing such as were still tranquil upon the combs. She soon had traversed the whole hive, when the agitation became general. The workers, now no longer attentive to the young brood, ran about in all directions; even those that returned from foraging, before the agitation was at its height, no sooner entered the hive than they participated in these tumultuous movements, and neglecting to free themselves from the masses of pollen on their hind legs, ran wildly about. At length there was a general rush to the outlets of the hive, which the queen accompanied, and the swarm took place."

A curious anecdote on this subject is related by the Abbé della Rocca. A person, not very skilful in the management of bees, was appointed to deprive a hive of part of its honey, and in the operation he wounded the queen. She immediately issued a most plaintive cry, and the bees attacked instantaneously all the spectators and the animals in the vicinity. A horse which happened to be tied to a tree contiguous to the apiary, was attacked with so much fury, that it broke the reins, and took refuge in a country-house; but the bees pursued it

with such acrimony, that it mounted the stairs of the first story, and burst into a room full of company, to whom it was no doubt an unwelcome visitor.

Huish was once witness to a singular circumstance respecting a swarm, which ought to be a warning to persons not to fasten any animals in the vicinity of an apiary, during the swarming season. A man who did not perceive that he was in the vicinity of a hive on the point of swarming, tied his ass to a post: the hive swarmed, and fixed itself on the muzzle of the ass; the patience of the animal could not brook the strangers, and it began to rub its muzzle on the ground. The indignation of the swarm was aroused, and the animal was so stung that it died in three days. The swarm was consequently lost to the proprietor.

Although swarms will often rise at the very instant when the greatest business is carrying on, yet, when it is a favourable day, and they are observed not to work, and but little noise in the hive, a swarm will surely take wing in an hour or two afterwards. Sometimes, also, there is a sudden throng of bees at the entrance, making loud alarms, as though going to swarm, which is evidently caused by the increased activity required on the appearance of a large delivery of young at once.

The cause of the motion of their wings has long been an object of investigation amongst naturalists, and, as may be supposed, has given rise to a variety of theories. The most rational one is, that it is

for the purpose of ventilation. On a summer evening, ten or a dozen bees will often be seen in the attitude of moving their wings, but some will be at such a distance from the entrance, that no possible benefit could accrue from their motion.

To guard against the fallacy of these signs, the most prudent method is to keep or appoint a regular watch, from the hours of nine, A. M., to three, P. M. Many persons select children for this purpose, who are often led away by a trifle, and thus the swarm, the chief profit of the proprietor, is lost to him. The following anecdote related by Mr. Huish will illustrate this fact: "A farmer, resident in the neighbourhood of my house, was obliged to absent himself from home, and he charged his son to watch one of his hives, which was expected to swarm. The father, on his return, enquired of his son if the hive had swarmed. 'Oh yes,' replied the son; and he pointed out the place where the swarm had alighted, but it had disappeared. The farmer reprimanded his son; but the latter exculpated himself by saying, 'You only told me to watch if the hive swarmed, and I did not know that I had then any thing more to do.' The swarm was consequently lost from the ignorance of the person appointed to watch."

The departure of a swarm is one of the most gratifying sights to an apiarian, and well repays him for many hours of anxious watching. The hive seems in a state of the greatest commotion; the bees appear as if some powerful enemy had taken posses-

sion of their hive, and were expelling them from it by force; the whole community is in a state of emigration, and thousands are seen circling the air in all directions. The first bees which leave the hive return, hover for an instant before the hive, and rise into the air; the whole swarm then leaves the hive, attended by the queen, and repairs either to some previously chosen spot, or fixes on the branch of an adjacent tree or bush.

SECTION III.—MANAGEMENT OF SWARMS.

Under this head we have to treat on the most inconvenient part of the bee-master's duty, and without a question it is an awkward piece of business to go amongst a mass of living stings, and yet come out unhurt. To accomplish this object, a dress has been proposed, which protects the wearer as effectually from the numberless lances of his overheated, but not ill-intentioned friends, as the most redoubtable champion in the Crusades could have enjoyed in his coat of mail, against the lances and swords of the Saracens. But as the inventor of the dress disclaims its use, and gives his instructions very clearly, we give the result of his experience in this matter, in the following directions, recommending no other defence than to drink a cup of good ale.

"Cast away fear, for you may hive them with safety, provided it be done with care and proper precautions. Boldness and gentleness are now equally necessary; every motion must be deliberate,

and without any hurry. Be particularly careful not to crush any of the bees, for the smell of their bruised bodies will excite the rest to fury and vengeance. Great care is at this time peculiarly necessary, as without circumspection, you may even kill the queen herself, as is too often done, and which will infallibly occasion the swarm, though well-hived, to return to their old home.

There is little danger to be apprehended from the bees when they swarm, because at that time they have many fears and apprehensions, and are therefore uncommonly gentle and pacific. At such times I have thrust my naked hand up into a middle of a swarm as they hung upon a bough, without their shewing the least resentment; which, had they been in their hives, they would not have suffered without the utmost indignation. But in bad weather, especially if it be windy, they become rather more irascible, and will not suffer any one to be quite so familiar with them; a pair of gloves will then be necessary.

Some are so very simple, as either to fumigate the bees with smoke, or throw water on them, from a notion that it makes them settle and become more quiet. But so far from answering this purpose, it destroys many of them, and makes the rest so desperate as not to be hived without great danger. And even when this is accomplished, they are so irritated at such uncivil usage, that they frequently rise out of the hive, and fly quite away. Whereas,

let the business be done with patience and circumspection, they may be hived, however badly situated, without any of these inconveniences.

Swarms are often divided by such injudicious management; part of them returning home, while those that remain, being so much diminished, form but a feeble swarm, and of little value.

It sometimes happens that a swarm divides while hovering in the air, and some fall to the ground. You must examine in this case with great care, for if you find any, it is very likely the young queen is among them; if she is, place her *upon* the empty hive, and take it as near as you can to the bees swarming: if only a few see her, they will give notice to all the rest, and presently settle upon the hive: over this another may be placed, into which they will ascend, without further trouble. But if the queen be not found, the bees, though well hived, will not remain, but either fly quite away or go back to the mother stock, or endeavour to gain admission into some of the other stocks, thereby occasioning tumult and slaughter.

When a swarm is upon the wing have an eye to your other stocks, and if any are preparing to rise, stop them until the swarm is settled. Then, if another rises, and attempts to unite with the first, cover it immediately with a cloth, until the other is also fixed; and so for all the others. For if double swarms be hived together, there will be a terrible slaughter, until one of the queens be killed; or

sometimes the whole swarm will quit the hive, and fly quite away.

If a swarm rises and returns back again to the stock, and you perceive them before many are got into the hive, immediately take the old stock away, and set an empty hive in its place; by this manœuvre, the swarm will be deceived, and settle quietly therein. It should then be placed in the most distant part of the apiary, and the mother stock set in its own place again. But if the swarm should be tumultuous and uneasy after it is in, set the old stock close to them, and they will soon be reunited to them again. For in this case, it is plain, they either had no queen with them, or had lost her in their flight; though there are other causes of a swarm's returning, as too much wind, or clouds portending storms of thunder and showers.

The form in which a swarm hangs from a bough, is that of an inverted cone, big at the top, and tapering to the bottom; the point being only a single bee: they adhere together in this manner, by hooking themselves to each other by their feet. But at other times, when the plant or tree will not admit of their being thus suspended, they spread round the body of a tree or branch, or upon a hedge, bush, shrub, &c., in a variety of directions, often very inconvenient for hiving.

Low trees near an apiary are very useful, for they attract the swarms to settle on them, which are thereby more easily hived.

No time should be lost to hive them as soon as clustered; for the longer they hang the more irritable they become, and the more unwilling they will be to hive. For when once fixed, they send out scouts to bring tidings of a proper habitation, and no sooner do these return, and touch the cluster, but there is a general shake of the wings; after this, they presently unknit and depart, unless they be immediately hived, and then it is a chance if they will stay.

A large cloth or apron, and a hive floor or other board, will be useful in the hiving. Spread the cloth upon the ground as nearly under the cluster as possible; on that, place the board, and a stick about an inch thick laid across; so that, when the hive is placed thereon, there may be ample room for the struggling multitude to enter more freely and be the sooner in. Or a swarm may be shook off a branch or shrub, into a cloth, properly held under by an assistant, and the cloth, with the bees therein, immediately laid on the ground; then place a hive over the bees, supporting one edge, a little raised, by a stone, or something convenient, so that no bees be crushed, and they will soon ascend up into the hive without any further operation, but that of screening them from the rays of the sun.

If a swarm hangs to a bough, or any thing that will admit of the hives sliding under them, first cut off, *in the most gentle manner*, any twigs that may

be in the way; then with your left hand press the inverted hive upwards, to inclose as much of the cluster as possible, without disturbing the bees, until with your right hand you give the bough a sudden and smart shake: this will cause most of the cluster to fall into the hive; among whom, in general, will be the queen. Keep the hive in your arm as it is, until you have got to the board or cloth; then gently turn it upside down; one edge upon the board, and the other upon the stick that lays across; any bees that have tumbled out, as well as those on the wing, hearing the buzz in the hive, will soon join them. With a few twigs, disturb those that attempt to settle again, and they will soon desist. But use no nettles, or water, which serves only to enrage and injure the bees.

Cover the hive with a cloth, boughs, or any thing proper to keep off the too piercing rays of the sun; *for otherwise the bees, finding their new habitation too hot, will be wise enough to quit it.**

If it should happen to be more convenient to hold a cloth or large apron under the bees, than a hive to shake them into, let the former method be taken, and gathering up the cloth by the corners, very gently and tenderly bring it down, and managed as directed. To avoid repetitions, either a cloth

* This result is so manifestly the consequence of the first cause of inconvenience, that we wonder the fact had not engaged attention before.

or hive may be used, as shall appear most convenient, in any of the operations hereafter directed. Let the hive remain in this state until the evening, and then (taking away the stick) remove it to the appointed place. If taken away before, the stragglers will be lost. But if it happens to be in a place inconvenient or improper to leave the swarm in until night, as soon as the bees are wholly got in, or nearly so, it must be covered with a cloth, and taken to its destined place at once: the stragglers that are left will then return to the mother stock.

Swarms sometimes cluster in trees much too high to be come at without the assistance of a ladder, steps, table, or the like, and very often at the extremity of a small bough, at too great a distance to be reached with the hive in your hand. In this case, after placing the hive in readiness under the tree, and having prepared a sharp knife, and a saw, ascend the ladder, and gently cut away all the small twigs and branches that surround the cluster, and examine if the bough on which it hangs can be cut through with a knife, as this will disturb the bees much less than the action of a saw. Keep the branch steady with one hand while you sever it with the other, or rather it should be held by an assistant, and as soon as cut through, be brought gently down, taking great care that the bees be not touched by any of the other branches. Then lay the bough, with the bees on it, very gently on the cloth or

board, and set the hive over it. Before the evening the bees will be fixed to the top of the hive, having quitted the bough, which may now be taken away, and the hive put in its intended place.

But should it be impracticable, or hurtful to a tree to cut off a branch, a basket or hive may be tied bottom upwards upon a long fork, rake, or pole, and held under the swarm while another person shakes the branch, either with his hands or some other instrument, so as to get as many as possible into the hive or basket; after which, the remainder are to be dislodged by a long stick, with small twigs tied to the end. Or they may be dislodged by twigs tied to the end of a long pole, until they settle more conveniently to be hived.

When they settle in a hedge, fix a hive over them, either upon forked sticks, or any other contrivance. But first sprinkle the inside top of the hive with ale and sugar; but *only* at the top, because it is to that part we want to entice them. Wait some time, and if this should not succeed, introduce a hive *underneath* them, as far as possible, cutting away such sprigs and branches as may obstruct its passage: then shaking the bush or hedge, cause as many as possible to fall into the hive, and continue so to do until they are wearied of returning to the hedge, or have gradually joined those in the hive, which they will do by this management in a little time. Lay two sticks across the hive, and set another over it, and by night those

that are upon the ground, and on the outside of the hive, will be all gone in, and collected with the rest now ascended in the upper hive, provided the queen be among them, otherwise she must be looked for among those upon the ground or about the hive.

Should they cluster round the body, or leading branches of a tree, apply the edge of the hive close to the body, a little below the spread of the bees, and where there is the greatest bunch or cluster; gently press the hive upwards, and with a small stick force down as many bees as you can into the hive, but be sure not to hurt any of them; then removing the hive to other *parts* that have the largest clusters, do the same there; it is very probable the queen will be among some of these. The hive must now be placed as near as possible to the tree, and the rest of the bees will join their fellows, provided they are so disturbed as to prevent their settling about the tree again. As this is a very difficult case, the bees will be unavoidably irritated, and therefore the face and hands should be properly secured.

The usual way of brushing bees into a hive enrages them most highly; this, however, is not all the mischief, for many are killed in the operation, and sometimes the queen herself; in which case, the swarm, even after having been hived, will fly away; nor will the apiator himself be safe, unless very well defended.

Authors direct, as a general rule, that swarms

should always remain near the place where they settled until the evening, as otherwise those bees that have not settled and are hovering about, not knowing where their companions are placed, will return to the old stock, and will be treated with the same severity as strangers. In the many observations I have made, I can assert that such consequence never followed, but that they were received as kindly as though they had never parted.

Stray swarms are frequently seen in their flight over fields and commons.

In such cases it will sometimes be a long while before a hive can be procured, and in the interim the bees may re-assume their flight; to prevent which, as soon as they are settled, throw your handkerchief over them, and tie it by the corners so as to inclose them; then cut off that part of the bough or sprig to which they hang, with as little disturbance as possible, and you may carry them in this manner several miles with great ease and safety. But should they settle on the ground, spread your handkerchief close by them, and with a wisp of grass or a small twig gently push them upon the handkerchief; or if your hat be laid over them, it is likely they will ascend therein.

When you have procured a hive, and have laid the branch across a pail or pan, and two other sticks across, untie the handkerchief, and set the hive over the bough, resting upon the cross sticks; let it stand until night, and all the bees will have entered

into the hive; but if you have them in a handkerchief, without any branch, lay the handkerchief on the ground, untie it, and place the hive over it; the bees will soon ascend therein.

There have been instances of a swarm settling upon a person's head. In this case, if any resistance be made, it may be attended with fatal consequences; but if you remain quiet and passive, without giving the bees any affront or disturbance, not one will offer to sting you.

As soon as you perceive a swarm disposed to settle on you, take off your hat, and carefully cover your head and face with your handkerchief; but if this cannot be done, place your hands hollow over your mouth, nose, and eyes, and then suffer them to settle upon you quietly, calling at the same time for assistance: or you may leisurely walk with the bees upon your head until you meet some one to assist you: let him take a prepared hive, and hold it over your head, and the bees will very likely soon begin to ascend therein; as soon as this is perceived the hive must be held a little higher, the better to withdraw the bees from the head; this will be sooner effected if you go into a room considerably darkened. But should this method not succeed, the bees may be taken off by a spoonful at a time, and put into the hive, until the greater part be taken off; then holding the edge of the hive so as to touch those that remain, they will soon crawl to those in the hive: or, by giving your head a violent and sudden

shake over a hive or table, the greater part will fall off, probably the queen: then walking to some distance, those that remain, missing the queen, will soon dislodge in search of her; but if, instead of this, they remain quiet, and the other bees return to settle on you, it is a sign you have still the queen about you; whom, however, at the next effort, you will probably shake off; the few then remaining may easily be taken off by a spoon. Sometimes also a great smoke made behind a person, so as to blow over him, will readily dislodge them.

All swarms, if the weather be fair, will begin to work almost as soon as hived; but if the first day be foul, so as to prevent their going abroad, it discourages them much."

These directions are so very full, that it is hardly possible any case can occur which has not been met; yet we feel surprised that a system of management, requiring such directions, and which compels swarming, should not have been made merely a help-meet to a more rational mode of management, considering that so great a number of practical men have taken up the subject: but so it is.

Even now, however, although ventilation has been proved to dispense with the necessity of swarming in those hives already stocked, yet the best ventilating hive must be dependent on a stock or a swarm to make a beginning: and we advise those who are about to use either of the hives to be hereafter described in this book, to remember that we

cannot make colonies of bees in a cheaper way than by putting a stock into a hive of a regular size, and forcing a swarm. The ventilating hives effect this object admirably; for by them a first grand swarm may be forced, and all casts prevented. But we forbear, or we shall trench upon our chapter on ventilation, or anticipate a description of the ventilating hive.

SECTION IV.—RELATIVE VALUE OF SWARMS AND CASTS.

In our description of the queen bee, a cause is assigned why some hives do not swarm, and why others send forth both swarms and casts. The multitude of swarms does not predict or promise the prosperity of an apiary. This fact is known to every person who has kept bees for any length of time: the reason will form the subject of our last section under this chapter. But to proceed: those swarms do not always prove the best, or prosper most, which issue as early as the latter end of April or the beginning of May. The weather soon afterwards is very wet and cold, which shuts them in and prevents their earliest labours so long that they have been either totally destroyed or exceedingly reduced; but swarms at the latter end of May or beginning of June prosper, and answer the most sanguine expectation of the bee-master. Now, if one of the early swarms be well hived, and the queen very prolific, they will immediately set to work, and

in an incredibly short space of time found combs—proceed with their work—and commence filling them. Reaumur says, "At this time, in twenty-four hours they will sometimes construct a comb, twenty inches deep, by seven or eight wide; and the hive will be half filled in five or six days; so that in the first fifteen days as much wax is made as in the whole year besides." The queen immediately lays her eggs, and a prosperous colony is soon formed; and, unless an accident of an unforeseen character takes place, this swarm may fairly be expected to fill the hive with honey, *after the brood comb is released of the brood.* This swarm, if allowed to stand through the winter, will be a strong stock in the spring.

But after the first swarm, by some entitled the "*maiden swarm*," which is supposed to produce "*virgin honey*," a cast generally follows: this is led forth from the hive by the queen which first emerged from its cocoon, when the *old* queen carried away the best part of the population in the maiden swarm. She is consequently so young that it requires a little time before she commences laying eggs; the bees which go out with her are fewer in number, as well as later in the season, and necessarily not so well able to build combs quickly. So that, although this first cast may, in good situations and seasons, manage to establish itself, experience has proved that they sometimes fail. When taken up the hives are generally found to contain an abundance of bees

and of comb: but the bees are *all dead*, stuck fast in the comb, and not one drop of honey. Sometimes a good maiden swarm throws a cast* which is rather inferior to a cast from a stock; but in general the bees coming from a new hive are very industrious and healthy, and make as much use of their time as a first cast, especially if the hives are situated near moors and wild districts, where two seasons for honey-gathering are readily embraced. But all subsequent casts from the parent stock, by some termed *colts*, seldom establish themselves sufficiently strong to stand half through the winter; because the drawbacks to the others are in this increased very much.

On the subject of maiden swarms producing virgin honey, we wish to set some of our readers right. The quality of honey does not depend on the age of *the bees*, but on the place in which the honey is deposited; for the extraordinary heat of a confined hive discolours the comb: while one place to rear young and store honey causes the bees indiscriminately to deposit bee-food, which is the dust of flowers, in the honey-combs for the use of the *young*. So that a very forward swarm will pollute its white combs, and when taken be little better than the old stock—while a cast or swarm, which has had little more than sufficient time to complete

* This by many is denominated *the maiden swarm*, but whether so or not affects but slightly the hints thrown out about virgin honey.

its store-room and fill the cells, when taken up will shew combs as pure as the driven snow. Virgin honey depends on the age of *the combs*, and a cool place to deposit them.

One more word and we will pass on: let those who make a profit by selling stocks in the spring, or desire to increase their apiaries, be very careful with all their swarms and casts. A fertile queen is associated with the last as well as the first emigration from the hive; so that, if a plan can be devised to preserve the weak stocks *by themselves* through the winter, although they may not swarm, they will assuredly make very strong stocks to swarm for a succeeding year, or be rich hives to deprive at the fall of the year. To accomplish this very desirable purpose, let each cast be examined before the cold weather sets in: if it have plenty of comb and little honey, give as much as will fill the combs; or if it be deficient in comb cut up some that are empty and give them; or if you have taken away any full combs from other hives, let them have one or two of them. This may easily be done by nailing two pieces of board together about two inches apart, with back and sides, the top largely perforated all over, with a moveable front. If you have merely to give honey, fill a garden saucer, and float a piece of paper pierced with pin-holes in it, to save the bees from drowning; the saucer is to be placed between the two boards, and then the front closed. When the hive is placed thereon, the bees will soon descend

and carry up the honey without exposure to the cold; or if you add empty or full combs, place them on the board edgewise, and cover with the hive: you are then in a situation to give honey from below, to fill the empty combs, which they will prefer to do rather than have full ones given them. A hint of this was given at pages 53 and 54, with a cut.

These remarks have reference only to those hives which uphold the old system of swarming; a much better plan, we conceive, is developed in the chapter on Fumigation, whereby the advantage of uniting two or more casts is laid down.

SECTION V.—WEAKENING INFLUENCE WHICH SWARMING HAS UPON A COLONY.

To commence this section, we, in some measure, involve the preceding; they are, however, so intimately blended, that we hope our readers will pardon the seeming repetition.

"*Very early* swarms are seldom large enough to constitute a good stock, and are in danger of perishing, if bad weather succeeds. *Very late* ones, though mostly large, will often neither have sufficient time to lay up an adequate store for the winter, nor rear a brood in time: *besides which, their emigration diminishes the parent stock so much as to endanger its being starved during the next spring.*"

A question was proposed to Huber, "What resource enables a common hive to swarm three or four

times without being too much weakened?" To which he replied :—

"I cannot lessen the difficulty. I have observed that the agitation which precedes swarming, is often so considerable that most of the bees quit the hive, and in that case we cannot well comprehend how, in three or four days afterwards, it can be in a state to send out another colony equally strong.

"But remark, in the first place, that the queen leaves a prodigious quantity of worker brood, which soon transforms to bees; and in this way the population sometimes becomes almost as great after swarming as before it.

"Thus the hive is perfectly capable of affording a second colony without being too much weakened. The third and fourth swarms weaken it more sensibly; but the inhabitants always remain in sufficient number to preserve the course of their labours uninterrupted; and the losses are soon repaired by the great fecundity of the queen, as she lays above a hundred eggs a day."

There is little question that the fecundity of the queen is so great that "their labours are uninterrupted." But what are those labours? Unquestionably a stock which sends out colonies four different times in one season must have had plenty of honey to pass through the winter; consequently the heat in the interior of the hive was well sustained—and if well sustained the queen was excited thereby to deposit her eggs, which were soon matured, and

hence many thousands of mouths were opened to receive food. In strong stocks, one of the first duties in the spring is to accumulate bee-bread, or rather *brood*-bread, for the growing larvæ. This hive begins the year with an impoverished treasury, because the honey has been eaten in the winter—with every excitement to increase its numbers, because there are so many in the hive that the heat is too great—no room to store honey, because the cells are being used for the cradling of the young—a great number of useless drones to support, (for be it remembered, in hives which are never swarmed the bees very soon destroy them,*) and each day is employed in the labour of providing for the wants of so many mouths: time is running on—and at last autumn approaches, with a few China-asters and Michaelmas daisies, with cold mornings and damp evenings, and our industrious colony is unprepared. The whole labour of the year has been wasted in colonizing and providing for relations, instead of laying by a store against a rainy day. Thus a hive which has passed richly through the winter, and raised four colonies to the proprietor, will most probably be so poor, and by poor we mean have gathered so little honey, as to run the risk of starvation through the following winter.

Huish says, "It is not possible to determine the precise number of swarms which a hive will throw,

* See note at page 53.

as this depends upon the fertility of the country and on the climate. It seldom happens that any but the two first are worth preserving, and every method should be pursued of preventing any more from leaving the hive: for after the departure of the swarms it is difficult to conceive in what manner the hives remain peopled: and there are some hives which are so enervated by the departure of the swarms, that they perish in the winter, if *some method* be not adopted of increasing the population; but this must be done with great caution, or the bees will exceed the quantity of provision.

One of the causes which destroys the bees proceeds from a bad season, *especially when two or three come in succession*: at that time, the hives by swarming being very weak, these poor insects are exposed to all sorts of accidents; besides, when a hive is weakened to a certain point, it is soon attacked by the moths."

The position laid down may be summed up in a few words.—While the bees are rearing young they neglect honey-gathering *in excess*, and while, under the new method, the bees have every facility to collect honey to excess, the breeding is generally retarded, or by ventilation retained in a particular part of the hive. Thus the colony is always kept in the healthiest and strongest condition.

"Many country people are persuaded that extreme cold and frosts occasion a great mortality among bees; during the severity of the winter of

1814, some were even so infatuated as to wrap their hives up in old blankets, or any other warm substances which they could procure."

Our readers must not suppose from the preceding remarks extracted from Mr. Huish's work, that blankets have only one use. Blankets being non-conductors of heat, are as essential to keep cold in as well as to keep it out, for they are very often used to wrap up ice when exported to hot countries, or in removing it from one place to another during the summer.

Now, if a hive be sufficiently filled with honey the most intense cold will be borne, because the colony is sure to have an equable heat, without the aid of blankets; but if during the summer the bees have been too busily engaged in rearing brood, they die during the coldness of winter, being few in number and poor in honey, unless there can be such an equalization of temperature, that they may be fed without exposure to intense cold, or so benumbed as to be unable to take the proffered boon. One thing is certain, that as blankets will retain heat, as on beds; so if a cold substance be wrapped in them, and laid in the sun, they will prevent the heat from penetrating the cold substance. Blankets might be made an appendage to an apiary, to shelter the hives during the winter from the sunshine, but yet we would strongly recommend, instead of so curious a scheme, to remove the hives to a northern aspect, to check *partial* outward warmth.

"In the travels of Gmelin in Siberia the following passage is to be found:—'Although the city of Casan is more southerly than Petersburg, the cold is nevertheless more intense towards the end of December; the air appears as if frozen, and resembles a fog, although the weather at that time is the most clear and fine: this species of fog, or rather this condensation of air, prevents the smoke from rising in the chimneys, and the humidity of the breath falls in rime on the chin. When a room is opened, a vapour is suddenly formed about the stove, and in the night the windows are covered with ice a quarter of an inch in thickness. Walking one fine day a few miles from the city of Casan, I had my face, my fingers, and my ears frozen, although I had not been half an hour on the road. I made use of the remedy recommended in such cases; I rubbed them with snow, and I was almost instantly cured.

'Notwithstanding the excessive cold, there is a great number of bees kept in Siberia. The natives hollow the trunk of a soft wooded tree to the length of five or six feet: at one of the sides they make an opening of ten or twelve inches long, and four broad; they close the opening with a board fitted in a groove, and form some little holes for the ingress and egress of the bees. They place these hives on the edges of the woods, and suspend them to the trees by bands of rushes, in order to prevent the bears from eating the honey, of which they are very voracious. The honey and wax which are obtained, form a considerable branch of the commerce of Casan.'

Another proof is taken from Travels in Lapland, by an officer of the king of Sweden. ' In these countries, in the vicinity of the pole,' says this officer, 'there are three months of continual night in the winter; the cold is so intense, that spirits of wine freeze in the thermometer; when the door of a warm room is opened, the exterior air converts the vapour immediately into snow. To observe the solitude in the cities, it might be supposed that the cold had killed all the inhabitants; it sometimes receives such sudden augmentations, that those who are unfortunately exposed to it, lose their arms, their legs, and sometimes their life. In the summer there are three months of continual day; and we are sometimes so annoyed *by bees and flies of all kinds*, that we are obliged to burn green wood to occasion a quantity of smoke, that they may be driven away.' "

The object we have in our next chapter is to devise and explain *the* method by which the weakest and most useless casts may be made subservient to profit—and by which those valuable old stocks, from which so many swarms have issued, may be effectually helped. In other words, we hope to give a plan, by which hives well filled with honey may have a weak colony billeted upon them, so that the former will be kept warm by the increase of numbers, and the latter be preserved from starvation for the sake of their company. Once more we refer our readers to the ventilating hives, which prevent all the annoyance of swarming.

CHAPTER IX.

FUMIGATION.

Four words there are of like import
In common parlance, though in short,
They each distinguish different plans
To practised apiarians.
To *suffocate* is to consume
The vital powers by sulph'rous fume;
But *fumigation*, you shall see,
The honey gains, and saves the bee;
While by a temporary shock
You graft him on another stock.
This gentle process may *intoxicate*
The insect brood, but not *inebriate;*
Which in these days of Temp'rance reformation
Would fill all honest men with perturbation.

FUMIGATION is not suffocation: in apiarian language these words convey one *primary* sense, and two *secondary* senses as dissimilar as possible. In their primary sense they are both intended to convey to the mind, that by artificial means the natural animosity of bees may be overcome, so that their treasures may be abstracted without risk to the proprietor; but in their secondary sense they may be considered as humanity and inhumanity—policy and impolicy—life and death. This at first may appear

paradoxical; but when the means used in the old mode and that now proposed are thrown into juxtaposition, the apparent discrepancy will be explained. We shall dismiss the *suffocating* process in very few words. The way to do it is this: in the latter part of the year, having determined what hives you mean to destroy, take a linen rag and cut it into narrow pieces, about six inches long, and then, having melted beaten brimstone, dip them therein. A hole must be dug in the ground, near the hives, about twelve inches across and six inches deep: at the bottom set two or three sticks crossed, over which put three or four of your smeared brimstone rags. When you have lighted them place the bees quickly over the hole, stop every opening, and the inevitable consequence will be the death of your bees, (poor fellows!) discoloured combs, and the bees' empty house. One author jeers those who complain of the inhumanity of the process; and in a sarcastic manner, asks if these tender-conscienced people would refuse to sit down to ribs of beef because the ox had been killed. The cases are not parallel: if he will first tell us how to get ribs of beef without killing the ox, we will fall in with his notions; but when we can and do tell him how to obtain honey, even under the old cottage system, without destroying life, surely he kills for the pleasure of killing; nay more, by means of the fumigator, we save the lives of bees and insure an abundance of workers for another year to give another supply. Now, if

the ladies and gentlemen who suffocate to obtain honey, could find another person like the idiot bee-eater of Selborne, mentioned by Mr. White, in his history of that place, there would be reason why the bees should be destroyed, being fit for food; but until such idiots are found we must still maintain our own view. "This boy was a resident in Selborne; he took great notice of bees from his childhood, and at length used to eat them. In summer, his few faculties were devoted to the pursuit of them, through fields and gardens. During winter, his father's chimney corner was his favourite haunt; where he dozed away his time, in an almost torpid state. Practice made him so expert, that he could seize honey-bees, humble-bees, or wasps, with his naked hands, disarm them of their stings, and suck their honey-bags, with perfect impunity. Sometimes he would store the bees in bottles, and even in his shirt bosom. He was the terror of the surrounding bee-keepers, whose gardens he would enter by stealth, and rapping on the outsides of their hives, catch the bees as they came out to see what was the matter. If in this way he could not obtain a sufficient number to supply his wants, so passionately fond was he of honey, that he would sometimes overturn the hives to get at it. He was accustomed to hover about the tubs of the mead-makers, to beg a draught of bee-wine, as he called it. As he ran about the fields he made a humming noise with his lips, resembling that of bees. The

lad was lean in his person, and of a cadaverous, unhealthy aspect: he died before he reached the age of maturity."

If these worthy sticklers for the old modes had lived in Africa, they would have had another good reason why they should destroy the bees, for in the notes to a most interesting volume, entitled "African Sketches, by Thomas Pringle," we have the following description of the honey-bird, which is so voraciously fond of the bees and young white larvæ and eggs, that it is continually craving help to get at its favourite food.

We hope our readers will pardon the liberty we have taken in introducing this morceau to their notice; but the reasoning of the woodpecker and honey-bird is so much more urgent than that employed by the advocates for suffocation, that we could not let it slip by without notice.

"In the country of the Amakosa wild honey is found plentifully, and the natives very frequently avail themselves of the assistance of the honey-bird, or bee-cuckoo *(Cuculus Indicator)*, in searching for it. This bird, which is of a cinereous colour, and somewhat larger than the common sparrow, is well known in South Africa for its extraordinary faculty of discovering the hives or nests of the wild bees, which in that country are constructed either in hollow trees, in crevices of the rocks, or in holes in the ground. Being extremely fond of honey, and of the bees' eggs, or larvæ, and at the same time,

unable, without assistance, to obtain access to the bee-hives, nature has supplied the Indicator with the singular instinct of calling to its aid certain other animals, and especially man himself, to enable it to attain its object. This is a fact long ago established on the authority of Sparrman, Vaillant, and other scientific travellers in Southern Africa.

With the habits of this curious bird I was myself acquainted during my residence in the interior of the Cape colony, and have often partaken of wild honey procured by its guidance. It usually sits on a tree by the way side, and, when any passenger approaches, greets him with its peculiar cry of *cherr-a-cherr! cherr-a-cherr!* If he shows any disposition to attend to its call, it flies on before him, in short flights, from tree to tree, till it leads him to the spot where it knows a bee-hive to be concealed. It then sits still and silent till he has extracted the honeycomb, of which it expects a portion as its share of the spoil; and this share the natives who profit by its guidance never fail to leave it. Some of the native Hottentots assert, also, that to obtain access to the hives in hollow trees, the honey-bird sometimes calls to its aid the woodpecker, a bird which finds in the larvæ, or young bees, a treat as enticing to its taste as the honey or larvæ is to that of its ingenious associate. I cannot vouch, on my own knowledge, for the truth of the latter statement; but as it seems quite in conformity with the general habits of this singular bird,

it may, at all events, be admitted a sufficient *poetical* authority for the following little fable :—

The honey-bird sat on the yellow-wood tree,
And aye he was singing—'*Cherr-cheer-a, cu-coo-la!*'
A-watching the hive of the blithe honey-bee,
'*Cherr-a-cherr, cherr-a-cherr, cherr-a cu-coo-la!*'

The bee-hive was built in the hollow-tree hole,
'*Cherr-a-cherr, cherr-a-cherr, cherr-a cu-coo-la!*'
Without any entrance but one little hole,
'*Cherr-a-cherr, cherr-a-cherr, cherr-a cu-coo-la!*'

The bees they flew in, and the bees they flew out,
'*Boom-a-boo, foom-a-boo, boom-a-buzz-zoola!*'
And they seemed to buzz round with a jeer and a flout,
'*Boom-a-boo, foom-a-boo, boom-bom-a-boo-la!*'

But the honey-bird swore by the aasvogel's* bill,
'*Cherr-a-cherr, aasvogel, gobb-a gob-oo-la!*'
Of their honey-comb he would soon gobble his fill,
'*Cherr-a-cherr, cherr-a-cherr, gobble-a-goola!*'

So he flew to the woodpecker—'Cousin,' quoth he,
'*Cherr-a-cherr, cherr-a-cherr, cherr-a cu-coo-la!*'
'Come, help me to harry the sly honey-bee,
'*Cherr-a-cherr, wood-peck-er, cheer-a chop-hoo-la!*'

Says the woodpecker, gravely, 'To rob is a crime,
'*Tic-a-tac, tic-a-tac, chop-at-a-hoola!*'
'Besides, I hate honey, and cannot spare time,
'*Tic-a-tac, tic-a-tac, snap-at-a-snoola!*'

Quoth the honey-bird, 'Cousin, reflect, if you please,
'*Cherr-a-cherr, cherr-a-cherr, cheer-a cu-coo-la!*

---

* "*Aasvogel*, the vulture. One of the most common species in South Africa is the *Percnopterus*, the sacred vulture of the Egyptians."

'The honey-comb's half-full of juicy young bees,
'*Cherr-a-cherr, cherr-a-cherr, gobble-a-goola!*'

'Ha! ha! cries the woodpecker, 'that's a strong plea—
'*Tic-a-tac, tic-a-tac, tac-at-a-foola!*
'I now see the justice of robbing the bee—
'*Tic-a-tac, tic-a-tac, snap-at-a-snoola!*'

'They're a *polypode* race, and have poisonous stings—
'*Tic-a-tac, tic-a- tac, chop-at-a-hoola!*
'And then they're but *insects*—and insects are *things*—
'*Tic-a-tac, tic-a-tac, snap-at-a-snoola!*

So the bee-hive was harried; and after their toil,
'*Cherr-a-cherr,*' '*tic-a-tac,*' '*snap-at-a-snoola!*'
The jolly birds jested while parting the spoil,
'*Cherr-a-cherr,*' *tic-a-tac,*' '*gobble-a-goola!*'

'Poor pigeons may prate about natural rights,'
Quoth the honey-bird, '*Coorr-a-moo, coorr-a-murr-roora!*'—
'But the merry owl mocks such poetical flights,'
Quoth the woodpecker, —'*Hu-hu-hoo! tu-whit! tu-whoor-r-a!*'"

We now proceed to describe the humane mode of *Fumigation*, and in our next intend to apply it practically. As the Rev. Mr. Thorley regularly practised it, his description is given:—

"The narcotic, or stupifying fume, is the *Fungus maximus*, or larger mushroom, commonly known by the name of bunt, puckfist, or frogcheese; it is as large or larger than a man's head. I had one of these brought me the last summer (unripe and white) which weighed some pounds; but when ripe, of a brown colour, and turning to powder, they are exceedingly light.

Shepherds, herdsmen, &c., frequently find them in the fields, and will supply you with them, towards the latter end of the season.

When you have procured one of these pucks, put it into a large paper, pressing it down therein to two-thirds, or near half the bulk, tying it up very close. Put it into an oven some time after the household bread is drawn, letting it continue all night. When it will hold fire it is fit for your use in the method following.

With a pair of scissars cut a piece of the puck as large as a hen's egg (better at first to have too much than too little), and fix it to the end of a small stick, slit for that purpose, and sharpened at the other end, which place so that it may hang near the middle of an empty hive. This hive you must set with the mouth upwards, near the stock you intend to take, in a pail or bucket. This done, set fire to the puck with a candle, and immediately place the stock of bees over it, tying a cloth round the hives (which you must have in readiness), that no smoke may come forth. In a minute's time, or little more, you will with delight hear them drop like peas into the empty hive. When the major part of them are down, and you hear very few fall, you may beat the top of the hive gently with your hand, to get as many out as you can. Then loosing the cloth, lift it off to a table, or broad board, prepared on purpose, and knocking the hive against it several times, many more will tumble out, perhaps the

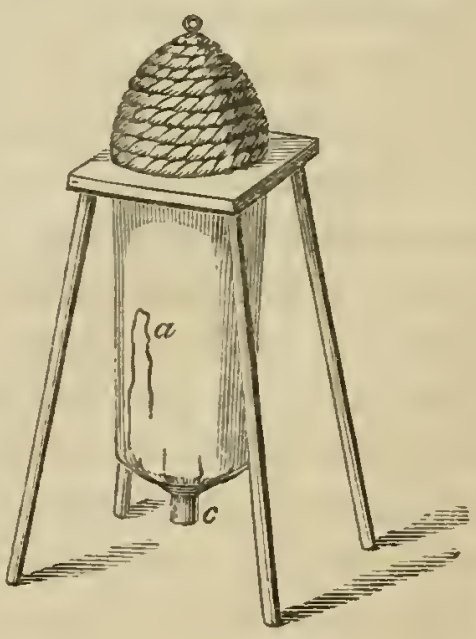
queen among them, as I have often found. Lodging near the crown, she often retains her hold and falls one of the last.

If she is not there, then search for her among the main body in the empty hive, putting them forth upon the table, if you discover her not before.

As to the hour of the day, I would advise young practitioners to do it early in the afternoon, that having the greater light, they may the better find out the queen. A little practice will make you perfect."

This is a simple description of the mode Mr. Thorley adopted to accomplish his purpose without killing the bees; but his application of the plan to the union of swarms and casts we shall reserve for the following chapter.

Mr. Nutt has simplified this manœuvre, by making it much more easy in practice; we therefore give a drawing of his apparatus, which consists of a square top board of inch deal, twenty inches square, with a circular space cut in the middle of thirteen inches in diameter. The opening is rather larger than the inside diameter of a common hive—so that

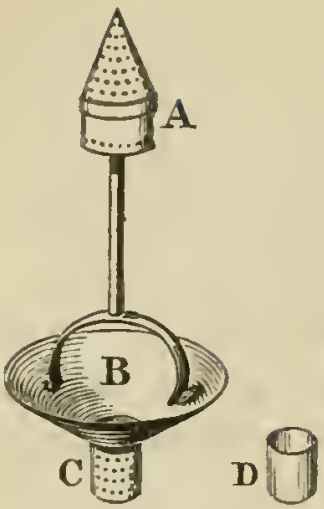


it will stand upon the part left, without any ledge inside, to allow free room for the stupified bees to fall. From the upper edge of this circle a bag marked (*a*) is suspended, a yard in length, made of glazed calico: the bottom part draws round the rim (*c*) of a shallow, funnel-shaped, tin bee-receiver, which is about ten inches across at the top, and its lower part, or neck, three inches and a half in length, and three inches in width. The bottom is open, but the sides of the lower part are perforated to allow fresh air: over this a close lid is fitted to hold up the fumigated bees, and also to stop the draught of air when not wanted.

The strings which are represented hanging loosely, (our representation supposing the fumigating process as going on,) are used to tie the bag tight in the middle above the fumigating lamp, to prevent the bees from forcing downwards before the fume arises. But as soon as the fungus in the fumigator is well on fire, the string is untied and up goes the fume.

After the hive is placed upon the stand, a damped cloth laid round its edge will effectually keep in the fume and the bees.

The apparatus is here represented as standing upon four legs, which screw into the top board; but it is quite as convenient in practice, and more portable, if, instead of these legs, it be made like common scales with a cord from each corner, which may be gathered into a small iron hook, and suspended from the branch of a tree.



We have drawn the fumigator large in proportion to the complete apparatus, to make a description of its parts clearer. (A) is the place into which the narcotic is put to be lighted, the lid shutting on like a common flour dredger. B is the shallow funnel-shaped, tin bee-receiver, which is open at the bottom, when the perforations (C) in the bottom are seen; but is closed when the tin can (D), which has a bottom to it, is placed over the perforations;—a short bent wire on this can holds it fast by an eye attached to the perforated part (C). When (D) is taken off, in the course of the process, it is found filled with bees, and many would fall on the grass, while it was being emptied. To prevent this inconvenience have a shallow baking-pan ready to put under, or what is more convenient, a second tin can, like that marked (D), to supply the place of the one just taken of.

The narcotic may be purchased in London, at Butler's, Herbalist, Covent Garden; or Potter's, Herbalist, Farringdon Market.

CHAPTER X.

THE OLD AND NEW METHODS OF UNIONIZING STOCKS EXPLAINED.

In the commencement of the chapter on fumigation, we have described the two methods of stupifying the bees to obtain their honey without destroying them, and shown that humanity and inhumanity—policy and impolicy—life and death, point out equally clear the true meaning of fumigation and suffocation. By the latter process, described at p. 151, the work is short. The case very often occurs, that, after a hive has been placed over the lighted sulphur, and all its inhabitants consigned to death, the thought occurs, on an examination of the interior, if the words be not expressed, "I wish I had not taken up this hive; how very little honey there is, and yet there are plenty of combs!" The sulphur has closed the scene; but if the bees had been merely stupified they might have been returned, and a sufficient supply of food provided to carry them through the winter at infinitely less cost to the proprietor, than the value which would attach to such a

hive at the fall of the coming year. But supposing our cottage-system friends should prefer to take up their hives under the old method, and consider the destruction of such a hive as a mere mishap, and of very little consequence, because they would require to be helped to live through the winter; we have a method of management to propose to them after we have related the following practice, which is worth a thought.

A system prevails in some of our northern counties, which partakes of so much good sense that we wish it could be got into greater notoriety, especially as it may be practised with success. In the neighbourhood of the great moors of the north there are cultivated districts in which a very large number of bees are kept. Those bee-masters, after having allowed the hives to stand in the cultivated districts until the heather is coming into bloom, which happens late in the season, have hives already full of the finest *flower*-honey; and to embrace the advantage of the gathering on the moors have recourse to the following experienced plan:—the hive is *fumigated*, which makes it *perfectly safe* to turn it over, and all the outermost comb is extracted, leaving only such cells as are indiscriminately intermingled with brood-comb, brood-bread, and honey. The intoxicated bees are then returned to the hive, and transported to the new gathering district, under the charge of some poor cottager, who, for the value of a crown or two, will allow the hives to stand near his

house. The advantages of this method are great, inasmuch as two seasons for honey-gathering are embraced—the bees have a house in which they have room to deposit their treasure—the proprietor gets the fine *flower*-honey for himself, while his bees supply themselves richly with the heather honey, equally congenial to their taste but less valuable in the market—and he can safely leave the hives far from his home without fear of swarming, because he has given so much new room that they *will not want to swarm*. Thorley's method, described at p. 157, is that used by these northern bee-masters. With such a power the practical apiarian may manage his bees to great profit.

Mr. Warder, of Croydon, in 1749, lamented the destruction of bees, but did not propose a remedy; yet, seeing the advantage of joining casts, he actually attempted the junction, and, in many instances, succeeded without the aid of fumigation. In speaking of the sulphur process, he says—

"This melancholy, and indeed tragical manner of taking the honey is the most unwelcome part to me to treat of: it being as well contrary to my nature to destroy those creatures I have so great an esteem for, as to my judgment. If you design to keep only a small number of bees, then, about the middle of *August* weigh all your hives, that is, poise them with your hands, by which you will be able to judge of their weight, and so take the heaviest and lightest; the heaviest, because they afford you most

honey, and the lightest, because they will not live over the year. If you find they don't weigh fourteen pounds, they will hardly live."

But, while Mr. Warder so pathetically deplores the destruction of bees, he has given us his method of unionizing casts and casts, or casts and swarms, or returning swarms to the parent stock. After describing the management of swarms when they first issue from the hive, he says :—

"Casts, or second swarms, as they are commonly ordered, come to little or no profit. Now there is not, I think, scarcely one cast in twenty, that will gather honey enough to keep them till the next spring; so that they are generally taken up at taking time with the old stocks; but they have so little honey in them, that they turn to no account. Now the way to make something of them is thus; (and pray believe me, for it will be to your great advantage :) put two or three of these casts together in one hive, and so they will become a good stock, perhaps as good as any one of your swarms, and stand over the year very well. The manner how to perform this seemingly difficult work, is very easy when known, which here shall be faithfully taught: when you have a cast or second swarm, take it into the hive, as you do the swarms, and put it in its place; then, perhaps, two or three days after, or a week, you may have another cast, up and pitched. Let this second cast be hived by itself also in an empty hive, and set under a tree where it pitched,

as before, till night; then you must put this second cast to the first, thus: spread a napkin about ten o'clock at night on the ground, close by the stool of the first cast, with a stick laid across the napkin; then fetch your second cast, just swarmed and hived that day, and strike the edge of the hive sharply on the stick which lies cross the napkin, to knock out all the bees, which fall out at that one stroke upon the napkin in a broad lump; then, throwing the hive out of your hand, take your first cast off from the stool, and set over the bees on the napkin, so will they, in about an hour, almost all crawl up, and become one family: if any of them, as sometimes they will, hang about the outsides of the hive, let them with a wing be brushed off upon the napkin, and they will soon go to their fellows; about twelve o'clock the same night take up the hive and put it in its place, so will you have two casts in one hive. In the same manner you may put a third and a fourth, and so you may have a strong hive of bees for the next year; for if they are in small parcels, they can do no good; for out of so small a parcel as one cast, when all their offices are provided for, there are so few to gather honey, that little can be done; some must be appointed to keep the brood warm, in order to breeding; some to keep court with the queen; some to keep guard at the mouth of the hive to keep away thieves. But when by this means of doubling the casts, you have aug-

mented your numbers, they will have labourers to spare to supply every occasion, and sufficient to gather honey for the family, stand all the winter, and swarm the next spring as well as any of the other stocks. The greater quantity of bees there are together, the better they are able to provide for themselves: my meaning is, that one peck of bees in one hive will get much more honey than two half pecks will do in two hives.

Swarms are put together in the evening to prevent two great inconveniences. *First*, If it were in the day, and they found such a disturbance in the hive, though the first swarm that was at home and had made some works, would very likely stand its ground; yet it is very likely the second would rise again, and perhaps fly away: whereas, being in the night, they cannot rise, but all night crawling one among another, they are united into one monarchy under one queen: for they dispatch the queen of the second cast most commonly before the next morning, and cast her out, though not always dead. Sometimes I have found her on the ground alive, but never without her guards about her, about two or three hundred, more or less, according to the size of the cast to which she belonged; which guard *de corps* never leave her until she is dead: for though the whole swarm is confused with the other, yet these whose immediate business it was at that time to guard their sovereign, are so faithful in dis-

charging of that trust, that they venture their own lives for her safety; and though on the ground with their queen in the night,* in danger of being chilled to death, yet, to preserve their sovereign from cold or danger, they all cling so close about her, that they seem to be one entire creature; and it is with some difficulty that I have got them apart to save the bees and put them to their fellows; which you may easily do when you have got away the queen, but not before. But, *secondly*, If you would put two swarms or casts together in the day-time, you will see the most dreadful battle † betwixt them that is possible to be conceived, to the great danger of both swarms or casts; for they will never give over fighting, in the hive and out of the hive, till one of the queens is killed; and perhaps not then neither: for many of these small warriors will not presently know that the other queen is dead, and so will keep on fighting to death for their own queen: for till

* See a parallel account in Chapter 13, on the Ladies' Safety Hive.

† The author had a box of honey which he had taken, and not being over anxious to clear out all the honey, he merely took as much as he wanted, and placed the box, with a considerable quantity of comb and a large number of bees in it, over the second set of holes as seen in the hive figured in Chapter 12. The object he had in view was to add to the population and stores of that method which he was trying, so as to force that scheme to its utmost; but the bees in possession under a queen, refused to allow the poor aliens a place, by taking the honey and *slaughtering all the bees.*

the queen of the hive doth come to know it, and cause the retreat to be sounded in her camp, there is no giving over fighting; but then, admitting all the subjects of the slain queen to favour, they become one family. But this great hazard, mischief, and the loss of so many bees as must fall in the battle, are prevented by doing this business at night."

Notice, in describing the daylight process, Mr. Warder admits there will be such a dreadful battle, that, with all your trouble, one-half of the bees will be destroyed and no good done. But the way to effect your purpose easily in the *daylight* is described in the former chapter; and the reason why the bees do not fight after a junction by the fumigating process will be given at the close of this.

Casts are universally allowed to be useless to stand the winter, and unproductive in taking up; yet we do not find that attempts are made to render them available. Old Butler, in 1634, knew the advantage of uniting swarms, and informs us that

"Ðos' ðat swarm befor' ðe blewing of knap-weed', coom in very good tim': befor' ðe blewing of blak-beris, ðey may liv and doo' wel: but blak-bery-swarms, specially castlings, ar seldom to bee kept, as beeing mór' lik'ly to dy' ðan to liv: and if ðey liv, ðey seldom swarm ðe next yær'. And mor'over, ðey weaken ðe stoks from whenc' ðey cam', which oðerwis' ðe next yeer' woold' swarm betime': and ðen on' such swarm is woork free of ðos' lat'ward on's. Wer'for' put such bak again

into đe stok: which you may easily dœ, (so sœn as đey ar hived) by knocking đem doun upon a table, clos to đe dœr: đeir fellows, đat ar behind, wil sœn bee in wiſ đem. And if đey ris again, serv đem so till đey ceas. But if you spi đem rising befor đe Qeen bee cœm forſ, shut đem in a whil, and đat wil stay đem.

A gœd stok dœſ naturally & usually cast twic, [a prim swarm, and an after-swarm:] (specially if đe prim swarm bee so rađ, đat đe castling may cœm befor đe bramble-bud bee open) yea and rađ prim swarms not over-hived, in a plentiful yeer, may swarm onc or twice: alđowgh sœm ful stalls dœ not cast onc, sœm but onc, and sœm, having many Princes (specially when đe prim swarm is broken) dœ cast freę or fowr tims. For sœmtim it happeneſ, đat a blak cloud rising, in đe swarming, stayeſ part of đem đat cam forſ first, and ly clustring about đe dœr: sœmtim, when they ar all up, eiđer fearing a cloud, or dislik'ing đe lighting-plac, or beeing trubbled in đe hiving, part dœſ return.

On prim-swarm is wœrſ two or freę after-swarms, except it bee broken: and đen (if đe residu cœm forſ in on entir swarm) đat after-swarm may bee đe better of đe twain: but if it bee divided into two or freę, đen wil đey all bee but indifferent: such, except đey be tim'ly, or united, can hardly liv until đe next Sœmmer."

So the Rev. Mr. Thorley, after describing the mode of fumigating for unions, says:—

"After you have got all the bees out of the first hive, and during the search for the queen, you must proceed after the same manner with the other hive, with which these are to be united. No sooner are those bees composed and quiet, and you have found and secured the queen, but you must put the bees of both hives together in one, mingling them thoroughly together, and sprinkling them at the same time with a little ale and sugar, putting them among the combs of the latter hive, and shake them down in it. When they are all in, cover it with a cloth, bound close about it, and let them stand all that night, and the next day shut up, that a bee may not get out. Some time after you will be sensible they are awaked out of sleep. The same night would be best to put them in their proper place, and if you had another garden wherein to fix them, I would recommend it.

The second night after the union, in the dusk of the evening, loosing the string, move the cloth from the mouth, (taking care of yourself,) and they will with a great noise immediately sally forth; but being too late to take wing, will go in again: then putting in two pieces of small pipe, to let in air, stop them close in as before, and keep them so for three or four days longer; after which you may leave the door continually open. But in taking away the cloth you must use discretion and caution, since they will for some time resent the affront and offensive treatment.

The best time of the year for union is after the

young brood are all out, and before they begin to lodge in the empty cells, which they do in great numbers in cold weather and winter-time."

Here we see the old system of driving exchanged for fumigation, and at once recognise the advantage.

The following circumstance respecting an artificial swarm occurred to Mr. Huish, which, in relating, he says: —

"I am convinced that, in many cases, the same plan of operation might be pursued with a certainty of success. An application was made to me by a person who kept a small apiary, informing me that he was under an apprehension of losing a hive of bees, and, under such circumstances, that he knew of no immediate remedy. He told me, that he was obliged to hive his swarm in a garden which did not belong to him, and was therefore compelled to remove it immediately after hiving, into his own premises. On inspecting his swarm on the following day, it appeared to him to have decreased in numbers, and on visiting the spot where the swarm had alighted, he discovered a cluster of bees which appeared to be in inaction, and not in the least disposed to return to their hive. It immediately occurred to me, that if these bees had a queen at their head, they might in time form an excellent colony. Having never succeeded in any of my experiments, performed on the principle of Schirach, I considered in what manner a queen was to be obtained. I had then in my possession a hive,

which contained a very weak swarm, and I was acquainted with a person who possessed another equally weak. By purchasing that and joining the bees to my own hive, I gained two important points: I strengthened my own hive, and obtained a queen necessary for the experiment which I had then in view. Having stupified the bees of the two hives, I took possession of one of the queens, extracting at the same time from one of the hives, a piece of comb in which some honey had been deposited. Having confined my captive queen in a little box, I fastened the honey-comb on one of the boards of my hive, and then brushed the bees, which were still hanging in a cluster, on the spot where they had swarmed, into the hive. They appeared at first in great confusion, which was in some degree increased by my disturbing them, in order to come to the positive certainty that no queen was amongst them. Having ascertained the absence of a queen to my entire satisfaction, I released my captive monarch, and I could immediately discover, by the motions of the bees, that she was a most welcome personage. The hive with my unexpected treasure was removed to my own apiary, and I regarded it with the partial feelings of a favourite.

This experiment, however, did not end here. Late on the evening of the same day I visited my new hive, and I was truly rejoiced to observe the success of my experiment. I opened the hive,—the bees were clustering upon the piece of comb, and I had

no doubt that the monarchy was established. Some fear, however, rested on my mind, that the number of bees was not sufficient to effect the general purposes of the hive; but how to obtain a reinforcement was a matter of some difficulty. In my apiary I had a hive, which, though very populous, had from some particular cause, not thrown a single swarm. I therefore resolved to try the following experiment on the subsequent day about eleven o'clock, when I judged that a considerable number of bees was in the fields: I removed my populous hive from its station to the distance of about a mile from my apiary, and in its place I deposited the hive containing the small number of bees and the captured queen. I gave this hive the same covering, and dressed it out in all respects perfectly similar to that which I had removed. The deception succeeded to the full extent of my wishes. The bees, hurrying from the fields, hesitated not to enter into the hive, which they mistook for their parent one, and I thus obtained an ample reinforcement for my hive, which is at this time in a flourishing condition.

I have every reason to believe that this plan may be successfully adopted in all cases where the swarms are weak in bees, and the second swarming of a hive might be altogether prevented by thus taking from it its superfluous population. The supernumerary queens of a hive might thus be turned to great advantage; and particular hives might be forced to give a portion of their redundant

population, in order to strengthen those which are fewer in numbers."

Another bee-master relates that "One of his stocks, at the latter end of the summer, had such a prodigious number of drones, that they consumed almost all the honey, as fast as the labourers procured it. This he thought shameful, and therefore, was determined to kill great part of these luxurious cormorants, as fast as they appeared at the doorway. At this time, there was a large number of workers at the door, drumming with their wings, and uttering joyful sounds. Unluckily attempting with his finger to crush, as he thought, a returning drone, but it proved to be the queen, he hurt her, though not mortally, ere he perceived his mistake. She staggered, and was unable to walk. The concourse of bees that were at the door saw her distress, and were in the utmost consternation; they licked her with their tongues, and used all the little endearments they could to restore her. This continued some minutes. But being still disabled, a number of bees got under her, and carried her upon their backs into the hive."

These anecdotes shew that whenever any operation connected with bees is to be effected, the latter part of the day is best, for then the queen is always within the hive.

We will sum up our thoughts on this interesting part of the study by giving Dr. Bevan's remarks, which, in our opinion, educe the real secret, while

fumigation introduces the bees of different stocks to each other without enmity. We think that one of their modes of recognition is by *smell* as well as by striking the antennæ; and that fumigation having communicated one uniform odour to all the bees alike, they are deceived until the pass-touch, or pass-word of the hive, if we may use the expression, has been generally communicated. Dr. Bevan says:—

"The union of swarms with their stocks, and of swarms or stocks with each other, in case of their being or becoming weak, has been attempted in various ways, and with various success, depending perhaps, in some degree, upon the skill and adroitness of the operator. Upon the storifying plan this operation will rarely be necessary, excepting in the case of weak stocks, as it is not a very common occurrence for storified bees to swarm, and when they do so, they generally throw off strong swarms. Still the object may occasionally be desirable, and it is worthy of attention, for *the tenants of well-filled hives are always the most active.*

The three usual methods by which union has been attempted, and indeed, their advocates say, accomplished, are *fuming them,—immersing them in water,* —and *aspersing them with sugared or honeyed ale.* To these I may add a fourth, namely, *operating upon their fears*, by confining them for a time, and then alarming them by drumming smartly upon the outside of their domicile. It was operating on their

fears that enabled Wildman to perform such extraordinary feats with bees. When under a strong impression of fear, says he, they are rendered subservient to our wills to such a degree as to remain long attached to any place they afterwards settle upon, and will become so mild and tractable, as to bear any handling which does not hurt them, without the least show of resentment. 'Long experience has taught me, that as soon as I turn up a hive, and give some taps on the sides and bottom, the queen immediately appears.' 'Being accustomed to see her, I readily distinguish her at the first glance; and long practice has enabled me to seize her instantly, with a tenderness that does not in the least endanger her person.' 'Being possessed of her, I can, without exciting any resentment, slip her into my other hand, and returning the hive to its place, hold her, till the bees, missing her, are all on the wing, and in the utmost confusion.' When in this state he could make them alight wherever he pleased; for on whatever spot he placed the queen, the moment a few of them discovered her, the information was rapidly communicated to the rest, who in a few minutes were all collected round her. In this way he would sometimes cause them to settle on his head, or to hang clustered from his chin, in which state they somewhat resembled a beard. Again he would transfer them to his hand, or to any other part of his body, or if more agreeable to the spectators before whom he exhibited, he would

cause them to settle upon a table, window, &c. Prior to making his secret generally known, he deceived his spectators by using words of command; but the only magic that he employed was the summoning into activity the strong attachment of the bees to their queen. Cautioning* his readers as to the hazard of attempting, what he himself accomplished only by long experience and great dexterity, Wildman concludes his account with a parody of the reply of C. Furius Cresinus, a liberated Roman slave, who, being accused of witchcraft in consequence of his raising more abundant crops than his neighbours, and therefore cited before a Roman tribunal, produced his strong implements of husbandry, his well-fed oxen, and a hale young woman his daughter; and pointing to them, said, '*These, Romans! are my instruments of witchcraft; but I cannot show you my toil, my sweats, and anxious cares.*' 'So,' says Wildman, 'may I say, *These, Britons! are my instruments of witchcraft; but I cannot show you my hours of attention to this subject, my anxiety and care for these useful insects;*

* We caution our readers to beware of attempting any of these foolish manœuvres. Mr. Wildman, no doubt, *was* a wild man all his days, or he would never have wasted "experience acquired during a course of years" on such senseless vagaries as making a swarm of bees fly after him, or settle where he pleased. For ourselves we can say, that whenever we have accidentally captured or injured a queen, or annoyed our bees in any way, they do not forget *the person* of the aggressor for some time, and repeatedly resent the injury.

nor can I communicate to you my experience, acquired during a course of years.'

The neatest and most scientific mode with which I am acquainted *of uniting weak families together in harmony* was invented by my friend the Rev. Richard Walond, whose experience in the management of bees, for nearly half a century, entitle his opinions concerning them to great respect. His theory and practice upon this subject are as follow:—'Bees,' says he, 'emit a peculiar odour, and it is by no means improbable that every family of bees emits an odour peculiar to itself; if so, as their vision seems to be imperfect, and their smell acute, it may be by this distinctive and peculiar odour that they are enabled to discriminate betwixt the individuals of their own family and those of a stranger hive.' Upon this supposition, if the odours of two separate stocks or swarms can be so blended as to make them completely merge into each other, there will then probably be no difficulty in effecting the union of any two families that it may be desirable to unite. To accomplish this end, therefore, Mr. Walond had recourse to a very ingenious contrivance: he procured a plate of tin, the size of a divider, and thickly perforated with holes, about the size of those in a coarse nutmeg-grater. Having confined in their respective hives or boxes, the two families to be united, and placed over each other, with only a divider between them, he introduced his perforated tin plate upon the divider, which was

then withdrawn. Immediately the bees began to cluster with hostile intentions, one family clinging to the upper, the other to the under side of the perforated plate; when, after remaining in this state for about twenty-four hours, they had so far communicated to each other their respective effluvia, and so completely commixed were the odours in both hives, that on withdrawing the perforated plate, the bees mingled together as one family: no disturbance was excited, but such as arose from the presence of two queens, the custom being always, in such case, to dethrone one of them. According to Huber this is effected by single combat between the queens. Keys has observed that *these incorporations seldom turn to account unless they be effected in summer;* and when it is considered that the principal gathering months are May and June, (excepting in those neighbourhoods that abound in lime, sycamore, and other trees that are apt to be affected with honey-dew,) we cannot, of course, expect them to be very successful."

This plan of the Rev. Richard Walond is very ingenious, and unquestionably, on his authority, proves our position,—that smell is one of the senses used by the bees to detect a stranger—and lead us to doubt the authenticity of accounts which state that the system of uniting casts by means of driving has been uniformly successful.

Our aim, however, is not to condemn, but to shew that fumigation is the easiest and surest operation.

But not to multiply examples, we will pass on at once to consider the use of fumigation in stocking ventilating hives: that which has already been said, we think, proves that our unconvinced country readers may save their weak casts to advantage, by joining two or three together, or adding a weak cast to an old stock.

By fumigation the ventilating hives can be stocked with the most perfect ease, and the combs adjusted in regular order; or two *strong* stocks may be put together in the early part of the season, and thereby a very large number of workers will be ready to fill up all your unoccupied space, and a whole year be saved. Another advantage is this: supposing you find that a colony has lost its queen, you can add the first weak cast that rises, and thus, by giving them a monarch and subjects, save a prosperous colony, which would assuredly have dwindled away; or if moths have entered a hive, you can lay it under fumigation and regularly examine every comb.

In fine, by fumigation the bees are made obedient servants, instead of haughty and revengeful minions. Let not, however, the practical bee-master use the newly acquired knowledge to torment his bees, but employ it when needed to the comfort of them—to the increase of his own knowledge, and to add to the metallic contents of his purse.

CHAPTER XI.

VENTILATION, A NEWLY DISCOVERED SECRET IN BEE-MANAGEMENT, AS AT FIRST DEVELOPED IN MR. NUTT'S HIVE, DESCRIBED.

"With hasty judgment ne'er decide;
First hear what's said on t'other side."

"Whenever you commend add your reasons for doing so: it is this which distinguishes the approbation of a man of thought from the servile admiration of ignorant people."

Our friends will be pleased to re-read the motto, and in harmony with that in rhyme, not come to the consideration of this new system with surcharged notions of the value of the works of the ancients. The principles of ventilation and equalization of temperature are points of equal value in the successful application of bees to domestic purposes: for excessive ventilation is as detrimental to bees as the very confined space allotted to them under the old cottage system. A vulgar error prevails that they should be left to follow the track which instinct points out, and that the least deviation from nature (which is to be seen most purely, it is said, in the

common cottage hive,) is to be reprobated: while the cavillers forget that even their plain hive is an inroad upon nature. The command of God at the creation was, "Increase and multiply;" and by his appointment "summer and winter, seed time and harvest," pursue their unwearied course. In none of his works is the command more clearly exemplified than in the economy of bees, for the fecundity of the queen almost transcends belief. But while the Almighty's word went forth, "Be fruitful and multiply," another followed, "By the sweat of your brow shall ye eat bread." Thus may we learn, that while the earth brought forth of every kind, it was man's labour and ingenuity that were to be the means of checking useless vegetation and aiding that which was valuable. The influence of such knowledge has been continually spreading; let us not, therefore, by tenaciously clinging to old notions, be backward to embrace every means by which we may take advantage of the peculiar instincts of bees; but when a system, founded on good theory, is propounded, follow it up, and in harmony with our prose motto, pay such attention to the subject, that "whenever you commend you may add your reasons for doing so."

The author's favourite writers, Kirby and Spence, have set this question of ventilation so delightfully before us, that once more we must have recourse to their clear description; and our readers will notice what a reverential feeling pervades the whole extract,

and what an evident desire those excellent individuals evince to raise the mind "from nature up to nature's God." The writer says, "I must not omit to mention the ventilation of their abode. When you consider the numbers contained in so confined a space, the high temperature to which its atmosphere is raised, and the small aperture at which the air principally enters, you will readily conceive how soon it must be rendered unfit for respiration, and be convinced that there must be some means of constantly renewing it. If you feel disposed to think that the ventilation takes place, as in our apartments, by natural means, resulting from the rarefaction of the air by the heat of the hive, and the consequent establishment of an interior and exterior current—a simple experiment will satisfy you that this cannot be. Take a vessel of the size of a bee-hive, with a similar or even somewhat larger aperture—introduce a lighted taper, and if the temperature be raised to more than 140°, it will go out in a short time. We must, therefore, admit, as Huber observes, that the bees possess the astonishing faculty of attracting the external air, and at the same time of expelling that which has become corrupted by their respiration.

What would you say, should I tell you that the bees upon this occasion have recourse to the same instrument which ladies use to cool themselves when an apartment is overheated? Yet it is strictly the case. By means of their marginal hooks, they

unite each pair of wings into one plane slightly concave, thus acting upon the air by a surface nearly as large as possible, and forming for them a pair of very ample fans, which in their vibrations describe an arch of 90°. These vibrations are so rapid as to render the wings almost invisible. When they are engaged in ventilation, the bees by means of their feet and claws fix themselves as firmly as possible to the place they stand upon. The first pair of legs is stretched out before; the second extended to the right and left; whilst the third, placed very near each other, are perpendicular to the abdomen, so as to give that part considerable elevation.

During the summer a certain number of workers —for it is to the workers solely that this office is committed—may always be observed vibrating their wings before the entrance of their hive; and the observant apiarist will find upon examination, that a still greater number are engaged within it in the same employment. All those thus circumstanced that stand without, turn their head to the entrance; while those that stand within turn their back to it. The station of these ventilators is upon the floor of the hive. They are usually ranged in files, that terminate at the entrance; and sometimes, but not constantly, form so many diverging rays, probably to give room for comers and goers to pass. The number of ventilators in action at the same time varies; it seldom much exceeds twenty, and is often more circumscribed. The time also that they devote

to this function is longer or shorter according to circumstances: some have been observed to continue their vibrations for nearly half an hour without resting, suspending the action for not more than an instant, as it should seem to take breath. When one retires, another occupies its place; so that in a hive well peopled there is never any interruption of the sound or humming occasioned by this action; by which it may always be known whether it be going on or not."

The mere pleasure of fanning we cannot suppose to be the actuating motive, but rather a desire to dissipate the inconvenient heat. In describing the causes of swarming this interior heat is fully explained, and is there suggested as the grand cause of forcing out the queen.

Now as Mr. Nutt deserves great praise and much encouragement for the indefatigable manner in which he has applied a hint, received from the bees themselves, we shall be rather free with his description, and by abridging what he himself has written, allow him to tell his own tale; especially as some persons have been concocting, as they suppose, a very pungent article against him. We will not name the periodical; but if its editor should see our pages, we suggest to him that when he admits strictures into his columns, founded on false premises, he casts a slur on his own judgment. It is not sufficient for an editor to say he did not write the article, but it came from a *valued* correspondent.

That is all very well as far as it goes; but surely he ought to have *read* it. We shall name one false statement of the critic, but say nothing of the spirit in which it was written; and on that alone rest Mr. Nutt's fair fame, and, we hope, reward. It is contemptible when men, who perhaps are paid so much an inch for scribbling, take up a popular subject to insure themselves a reading, and undermine the fair fame of a practical man, who has done the drudgery and ought to reap the reward, instead of fairly entering into the difficult study themselves.

Our readers, to judge for themselves, must bear with us in quoting the reviewer's own words :—

"The author has favoured his readers with a dialogue, which he states took place between himself and a learned lord at the National Repository. It is to be hoped Mr. Nutt will be kind enough to allow his readers to form their own opinion respecting the profundity of his lordship's learning. The conversation commences by his lordship communicating to Mr. Nutt that he has six cottage-hives of bees on his estate, which he wishes to put upon his principle of management, and desires to be informed how to accomplish the desired object?' Mr. Nutt very cautiously says, 'My lord, much depends on the state of your hives. Are they rich? Will the six hives make three good colonies?' His lordship, with great candour, immediately replies, 'I do not know;' but asks, 'if three are rich, and three poor, which would you advise me to establish on

my estate?' Mr. Nutt replies, 'The three rich ones; for, by uniting the bees of a healthy* hive with those of a light one, the light one being already incapable of supporting its own population, many persons have failed of success. In fact, he elegantly adds, 'it is an *unhappy*, i. e. a *wrong move*.' The very next time, however, Mr. Nutt opens his mouth, he gives this oracular dictum of his the most flat contradiction. 'Your lordship's three rich hives,' he says, 'will receive the numerous bees of the three weak ones; and they will, *notwithstanding such additions to their numbers, be in a state of prosperity, and* ALL *your bees be in the greatest safety*.' It is an 'unhappy—a wrong move,' and yet produces the best possible results!"

If the reviewer had first drawn the beam from his own eye, possibly he might have seen more clearly how to pull the mote out of his brother's eye. Why be so hard upon nobility?—their rank at least should shield them from sneers; but let us see who really was the most clever—the sneerer or the sneeree.

Mr. Nutt puts this position: supposing a person intended to unite six common cottage stocks into *three*, under only three queens, and those stocks were of the same age, but weighed differently: three being *heavy*, and three light, but all *healthy*; that it would be more advantageous to put the light to the heavy stocks, because in them there is most

* In the original this word is "*heavy*," which gives a turn to the argument against the reviewer.

honey to eat through the winter; rather than the heavy to the light stocks, because the lighter a hive weighs, our old bee-masters tell us the less honey there is likely to be. This is so self-evident that we wonder the acumen of such a diffuse reviewer as we have quoted, should have failed to discover the feasibility of Mr. Nutt's plan, and that the sneeree was not quite so stupid as supposed.

We could wish Mr. Nutt's friends had pruned his work of much verbiage before it had appeared before the public; but on this point we expect he will have abundant opportunity to mend in repeated calls for new editions. Here we dismiss the reviewer to describe the new hive, and how Mr. Nutt was led to the information.

Mr. Nutt says:—" I would ask my worthy bee-keepers, whether they have seen a honey-comb suspended under the pedestal of their hives? The beautiful appearance of a comb in such a situation is, as it were, the very finger of Providence pointing out the effects of ventilation, and shewing us the necessity there is for it in a crowded, busy hive.

This occurrence one day having excited my curiosity, led me to enquire into the cause of it, and to discover why the bees should construct their combs in such a situation. My observations soon satisfied me that either want of room or oppressive heat —or most probably, a combination of these two causes, rendered it necessary for them, if they continued working at all, to carry on their work in that

singular manner. My next step was to endeavour to prove the truth of my reasonings and conclusions.

As I have been frequently asked to explain the utility of ventilation in a colony of bees, so have I as frequently been asked, 'What has the thermometer to do with them?'

The thermometer is the safest, if not the sole guide to a *scientific* knowledge of their state and works. To ventilate a colony when their interior temperature is under 60 degrees, is ruinous to them, because contrary to their natural labours. Their nature is to encourage that heat, for as the temperature rises, so does it invigorate and encourage an increase of population. As the hive fills, so will the thermometer rise to 120 and even 130 degrees, before these worthies will leave their wealthy home. When the thermometer is at the above height they have arrived at the highest state of perfection,—wealthy indeed, every store-house being filled nearly to suffocation with their abundant treasures, and they, as it were, petitioning the observer of their too-limited store-house for a fresh room. Then give them a fresh room,—accommodate them with such a store-house. Suffer them not to swarm: an emigration from a prosperous colony of half its population cannot fail of being very disadvantageous both to those that emigrate, who must necessarily go out to seek their fortunes, and to those that remain, be they ever so industrious or ever so wealthy.

When you discover your thermometer changing

rapidly, and, instead of standing, as it generally does, at about 80 degrees, rising in a few hours perhaps to 90, you may conclude that ventilation is then highly necessary. The more you ventilate, when their temperature gets to this height, the more you increase the bees' labour; for when they find a comfortable temperature within, they enjoy it, and will proceed to fill every vacant comb.

To establish these assertions, and to prove the practical utility of ventilation in the management of bees, I introduce some interesting experiments, and then add a very few extracts from my thermometrical journal of that summer, which in fact guided me in those experiments, from which, taken together, it will be sufficiently evident that ventilation is *indispensable* in the proper management of honey bees.

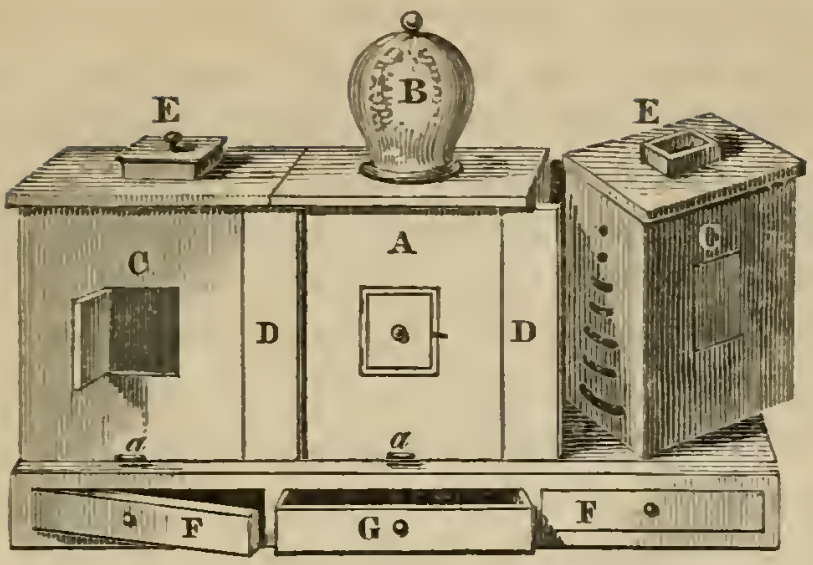
I suffered a colony of bees to swarm. It was a very fine one: the thermometer had been standing at 110 for six days previously, in the collateral-end box; on the eighth day it rose suddenly to 120. I was then forcing my bees to leave their home; I could have lowered their temperature, and by so doing have retained my worthies in their native boxes: but I was then about to prove a fact of the greatest moment to apiarians. On the ninth day, at half-past twelve o'clock, a fine swarm left the hive. After remaining about five minutes in the open air, the queen settled on a tree where she was exposed to the sun: I immediately hung a sheet before the swarm to ward off its intense heat, which

hung in this situation until the evening. During the absence of the swarm from the colony, I watched the movements of the parent stock, in order in the evening to return the swarm to their own hive which they had been forced to leave. Curiosity and a desire to solve a doubtful problem, led me to act as already related, at the expense of much inconvenience to the bees. Those which remained continued to labour during the day, and in the evening the thermometer had sunk to 90 degrees; so that the absence of the swarm had lowered the temperature 30 degrees: I then took off a fine top-glass filled with honey. This operation further reduced the interior heat of the colony.

I subsequently pulled up a dividing tin slide, and the colony was reduced to 65 degrees, the exterior heat of the evening. I was now convinced of the propriety of returning the swarm. I accomplished that object at ten o'clock in the evening, by constructing a temporary stage near the mouth of the parent stock; when having spread a white sheet upon the table, I shook the bees on to it. The swarm in the course of the evening, before dark, had been regularly hived, and were shook from the hive on to the temporary stage. I then captured the sovereign of the swarm; as soon as she was taken away the bees seemed to miss her, but they were placed so near to the mouth of the parent stock that they soon caught the odour of the hive, and in about fifteen minutes the whole swarm, save only her majesty, were under their

own roof again. The following morning, fearful of a disappointment for the want of a queen, at sunrise I released the captive queen. I placed her on the front board, to ascertain whether there was one within the state greater than herself, but no visible sign of such being the case presented itself. The influence of the sun soon roused her to activity; she was met by thousands of her subjects at the door of the hive, who soon conducted her to the seat of her native throne, which a few hours before she had been compelled to abdicate. The bees afterwards sallied forth with extraordinary regularity, and filled a large glass with honey in the short space of six days.

During nine days after the swarm had been returned to the parent stock, the thermometer continued to rise until it reached the temperature of 90 degrees within the collateral box; and on the tenth day, at five o'clock in the morning, I viewed with pleasure the extraordinary fact I had been endeavouring to ascertain—*two royal nymphs were left dead on the alighting board* of the principal entrance to the hive. This circumstance alone convinced me that no more swarming would take place. On the third day afterwards the bees commenced the destruction of the drones, which is another corroborating proof. *That colony has never swarmed since I first discovered the use of ventilation.* And on minutely attending to the movements of this colony, it was common to see royal brood of different ages lying dead upon the alighting board."



Above we have given a drawing of Mr. Nutt's hive, and proceed to give his further directions:—

"The most suitable dimensions for bee-boxes are from eleven to twelve inches square inside, and nine inches deep in the clear.

The wood should be well-seasoned, and free from *shakes*. Red deal is much approved. The sides of the boxes marked (C) should be an inch and a half thick; one inch thick will do for the ends, top, and back part; the sides, that form the interior divisions and openings, must be of half-inch stuff, so that, when they are placed together, the two should not exceed five-eighths of an inch in thickness. These perforated sides form either a free passage of communication or a division, as the case may require, being cut into apertures exactly similar to each other. These boxes can be divided without injury to the combs. The frame-work for the ventilators (E), which appears upon each of the end boxes,—

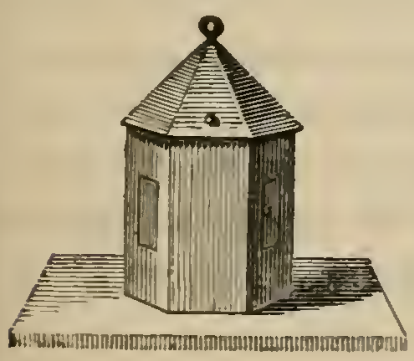
the one with the cover off, the other with it on—must be four inches square, with a perforated, flat tin of nearly the same size, and in the middle of that tin a round hole, an inch in diameter, to admit the perforated tin ventilator, nine inches long. This flat tin must have a smooth piece of wood to fit it close, and which is the cover to the frame-work just mentioned, and carries the wet off; then placing this cover over the square perforated tin, your box is secure from the effects of wind or rain.

We next come to the long floor, on which the three square bee-boxes which constitute *a set* stand collaterally. This floor is the strong top of a long, shallow box, made to support the three bee-boxes, and must, of course, be superficially as large as the boxes, when placed collaterally. For ornament as much as for use, this floor is made to project about two inches in front; but this projection must be sloped, to carry off the wet from the front of the boxes. In depth, this floor-box, measured from outside to outside, should be four inches, so that, if made of three-fourths inch deal, there may be left full two inches and a half for the depth of the box part. Internally it is divided into three equal compartments, being one for each bee-box: admission to these under boxes is by the drawer (G) and blocks (F), which will be described presently.

It is quite necessary that the boxes should stand perfectly air-tight upon the aforesaid floor. In the floor-board are made three openings, near the back

of each box, which are of a semi-lunar shape, the straight side of which should not be above three inches in length. They are covered by perforated, or by close tins (*a*), as required. The drawer (G) under the middle box is used to feed the bees. This drawer is water-tight, in which a thin wooden frame, covered with fine strainering, floats on the syrup deposited for the bees. Here, then, you have a feeder, containing the prepared sweet, in the immediate vicinity of the mother-hive, and without admitting the cold or the robbers to annoy the bees. When you close the drawer thus prepared, you must draw out the tin (*a*) placed over the semi-lunar aperture, which opens to the bees a way to their food in the drawer. The heat of the hive follows the bees into the feeding apartment, which soon becomes the temperature of their native hive.

The block fronts (F) facilitate the adding of numbers to the establishment, which is done without the least trouble to the apiarian, or resentment from the native bees; and afford to the bees a place of egress when you are about to take one of the end boxes, by cutting off the communication with that box and the one in the centre.



The octagon-box is a covering for the bell-glass (B), which is placed on the middle box. It matters not of what shape this covering is, because any covering over the glass will answer the

same purpose, provided the under-board of it is wide enough to cover the divisional openings, and to throw off the wet. I choose an octagon because of the neatness of its appearance.

A bee-passage to the bell-glass is cut in the centre of the top of the middle box, an inch in diameter, and from its edge are cut four or six passages, just wide enough to allow the bees space to pass and repass. These lineal cuts must of course terminate within the circumference of the circle formed by the edge of the bell-glass that is placed over them."

The centre box (A) is that which always remains untouched; while the two fillets (D) are intended to overlap the end boxes to prevent too much ventilation.

We have been very particular in describing the new principle of ventilation detailed in this chapter, and its application, as seen in Mr. Nutt's hives, because, in our opinion, without it no *permanent* system of bee-management can be secured. Hives may do well for a short time, but will fail eventually unless some means of easy enlargement and easy ventilation be adopted. As practical apiarians, we wish Mr. Nutt the greatest success; and hope his endeavours to improve the delightful occupation of the management of bees, will be properly met by a discerning public; and then he may fairly say to those who have endeavoured to injure him, in the words of Junius, "Their praise is censure, and their censure praise."

CHAPTER XII.

THE COTTAGER'S VENTILATING HIVE.

"Like father, like son."—*Old Proverb.*

In prosecuting inquiry, and giving opinions, throughout this work, up to the present chapter, the author has cloaked himself behind the very convenient pronoun *we;* or, by writing in the third person, has preserved himself from the appearance of egotism. In this chapter and the next, he intends to appear under the more appropriate pronoun *I;* and with the fear before his eyes of being charged as an egotist, throw off the garb. The facilities of description, and the comfort of easy writing, he presents to his readers as an apology, if one be considered necessary.

I was particularly struck, one day in the country, after conversing with a friend, to find he was *determinately* fixed in his own opinion, and would require more argumentative power than I possessed to turn him from his purpose. The subject of conversation was suggested by a visit to the bee-house. He was an advocate in favour of the cottage straw hive; while I was equally strenuous in support of

Mr. Nutt's ventilating hives. I descanted on their use in preventing swarming—on their capacity to receive honey to any extent, if a favourable honey-gathering time occurred—on the certainty of pure honey;—in fact, I ransacked my brain to find as many arguments why he should purchase only one as a specimen for his part of the country, as would, if advanced to a candid inquirer on other subjects, have convinced the veriest sceptic; but he was as obdurate as a mule, and coldly replied, "Ah! it's all very true; *but those hives* cost money." I endeavoured to show how much expense might be saved by Mr. Nutt's plan,—such as the regular supply of new straw hives for swarms, a bee-house to put the hives in, and boys to watch at swarming-time; but still he reverted as coldly as ever, "*Those* hives cost money." I was determined, however, if possible, to gain an advocate in an untried part of the country, and urged him to buy a hive, in connexion with others in the neighbourhood, to try the scheme; when I was again met by the old repulsive answer, "Those hives cost money; and it is enough for us to eke out the wages through the week, and that leaves none to lay by for hives, if the children and wife are to have clothes to their backs." I could not help feeling the force of this remark, and desisted, determining, if possible, to adapt Mr. Nutt's invaluable discovery to the necessities of the poor: I may add, also, to the prejudices of rich and poor. There is something so

very rural in a bee-hive made of straw, with all its busy inhabitants playing their pretty and innocent vagaries around the entrance, while the unceasing hum inspires such a degree of joyous feeling in the passing observer's mind, that even straw hives, hanging about in country villages, produce a chain of thoughts of a very peculiar character; but if seen in the busy, crowded streets of large cities, how ardently the flame of rural delights bursts out! Can we wonder, then, if the cottager who has been accustomed to the sight and use of straw hives all his life, should feel an almost reverential feeling for them? At Dover, the cliff opposite the Castle cliff is cultivated within a yard or two of the awfully impending edge that faces the sea. I once saw there a huge plough of the oldest fashion at work, which from its peculiar shape and mode of work, was a perfect contrast to those made by Perry, and used on the rich loams of Middlesex; or the Scotch plough, with two horses abreast, and guided by the ploughman. The land on the cliff was a very light sand, while that in Middlesex is much more stiff and difficult to work; and yet, on inquiring of the farmer, who was himself ploughman, why such cumbrous ploughs as that before us were not superseded by lighter, especially as the land was sandy; I was informed that the same ploughs had been used as long as the memory of the oldest inhabitant could retrace, and they had been universally allowed to answer the purpose. To argue,

would have been to waste breath; and to have sent a plough down to Dover as a present, would have been as useless as if the value had been thrown into the kennel of Cheapside.

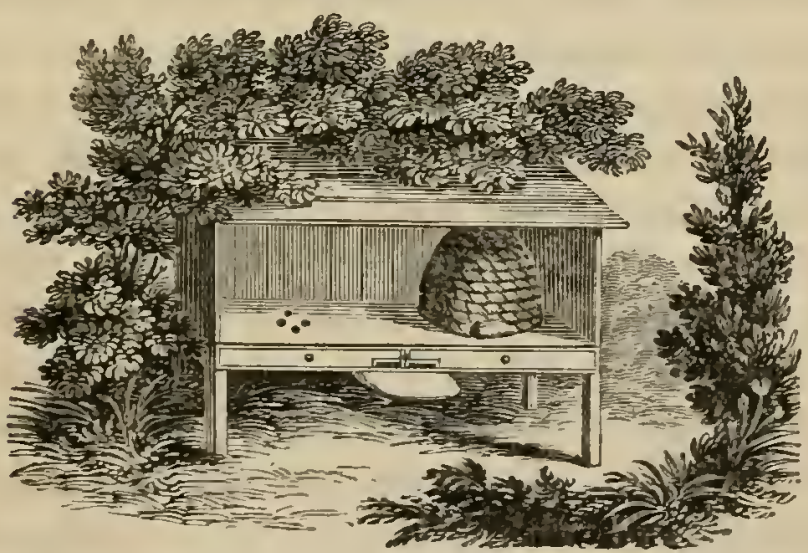
Generally speaking, such is the determinate adherence of country people to their own ways, that, so far as my experience has led me, I find the only means to gain such individuals is to caricature the objectionable part of their system, and then, allowing them their own method at first, modify and improve by little and little. Such being my conviction, I thought of the plan of a cottage *ventilating* hive, as likely to meet the peculiarities of the prejudiced bee-keeper, and to introduce the choicest part of the improvement of Mr. Nutt's hives. I determined to use the old-fashioned straw hive, not from a conviction of its value, but because a countryman would reject a wooden hive, without giving it a moment's consideration. In my opinion, a wooden box, made in whatever shape fancy may dictate, is much to be preferred to straw, or similar materials, on the score of durability, if for nothing else.

Ventilation is the grand secret divulged by Mr. Nutt. I attempted to elucidate it in the eleventh chapter, which should be impressed upon the mind of my reader, or I shall fail to make myself understood in the following description of the hive, and its mode of management.

The first thought which suggested itself to my

mind, when attempting to accommodate Mr. Nutt's discovery to the cottager's use, was this, How many materials already possessed by them can I bring into use? I supposed each one who would be willing to try the scheme had got a little further on in the management of bees, than the old-fashioned coverings and stools shown at page 55, and were possessed of a place in which their hives were sheltered from the rain and sun. I supposed also that the proposal of any thing like puff-balls and fumigators, for stocking hives, would cause certain failure; and that as the hives were already possessed, it would be better to use them. I therefore determined at once to try a stock exactly the same as I intended to recommend to my country friends. I shall therefore give a description of my own

COTTAGE VENTILATING HIVE.



The drawing is made from that in my own garden, not possessing a bee-house; because Mr.

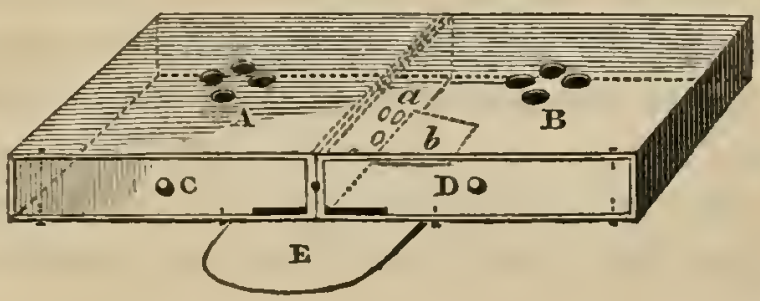
Nutt's ventilating hives do not require such an expense. The legs, back-board, sides, and sloping roof, are only useful to protect the hives from the wet; while the whole of the scheme lies in the double bottom. This bottom is made as long again as the diameter of a hive, with four inches more, to allow two hives to stand side by side; the four inches keeping the hives clear of each other and of the sides, and giving room for the hands of the operator. The width is to be two inches more than the diameter of a hive, to allow one inch in front, and one inch free space behind. The bottom being double, two boards are to be cut to one size, one for a top board, and one for the bottom. These are to be joined together by means of slips, two inches in depth, along the whole length of the back, and at the two sides. The front edge I will leave open for the present, and describe it afterwards. The black spots on the bottom, even with the hive, represent augur holes an inch in diameter, cut through the top board; and under the hive the same sized holes are cut, although not seen: their use I shall give presently. In the centre, between the two boards, now nailed together at the ends and back, I placed a division running from front to back, made of two blocks placed so closely together as only to allow a thick tin slide to pass between them. These blocks are perforated with holes an inch in diameter, which give a passage from one side to the other, when the tin slide is out, but are closed when

the slide is pushed in. On an examination of the drawing, the head or handle of this slide is seen like a projecting knob in the centre.

It now only remains for me to describe the front openings, which have not yet been closed. To each is fitted a block an inch thick, exactly like the front of a drawer, but without any drawer attached, with a long, low opening in each adjoining the centre division; which are openings to allow the bees to pass in and out to their labours. To these openings slips of wood are fitted, to be removed as directed in the after practice. The front blocks are kept in their places by pegs, although it is hardly necessary to remove them. The alighting-board is the last matter to describe, which is to be large, sloping outwards, to throw off the rain, and wide enough to embrace the two horizontal openings in the front blocks.

I have now led my readers through the mode of making this simple article; and by giving a concise account of my own practice, they may adopt what I have written for their own government.

The article, when finished for a bee-house, is like the following diagram, which is more clearly seen



separately figured, than when placed in its covered stand, as in the drawing at page 201.

To commence the plan, I removed a strong colony of bees in a common cottage hive, to a stool near that about to be stocked, which I allowed so to stand for a few days, until the bees had got well accustomed to the locality. In the evening of the day when I deemed the bees had commenced their regular labours in their new quarters, I gently raised the hive on the stool about an inch, with small wedges, to cause a coolness below, which drove all the bees among the combs. In about two hours afterwards I took the straw hive from the stool, and gently placed it over the holes on the right side, marked B. The slide between the blocks *was in its place*, and the two horizontal door-ways in the front blocks, marked C and D, were also both closed; so that all I had effected was a simple enlargement of the hive, by giving cool room below, with a way into it through the holes B, but no way out, except through the old door of the straw hive. The bees had been hanging out of the hive in masses before this removal, but now they were *perfectly contented and cool.* I therefore left them with the old door as a place of ingress and egress, for about a week, when indications of uneasiness manifested themselves: I then mixed up some clay and horse-dung into a soft lump, and with it in the evening covered up the door-way of the straw hive, and afterwards

opened the long door-way in block (B), by taking out the slip of wood which had closed it. To my delight, the bees sallied out by the new opening, in the most regular manner, and were hard at work surveying the new alighting board, and carrying out little bits of shaving left by the carpenter, as though they had been a first swarm in a new straw hive.

My readers must bear in mind that, up to this point the slide had not been withdrawn, the holes marked (A) had not been covered, nor had the bees yet been permitted to pass through the long opening in block (C). In fact, all I have yet described is little more than a clumsy way of adding an eke. (See page 62.) No new principle has been put into operation.

The bees continued regularly to go on with their work, until they had filled with comb the half of the bottom to which they had access; and, having no means of cooling the hive, the number of drones flying in and out was very great: the bees clustered for swarming, and covered the whole front of the block (D), and up the outside of the hive. I then thought it right to apply the ventilating principle, and give my over-heated labourers plenty of cool room. The plan was this:—I placed an empty hive over the holes marked (A), with a tin let into its crown, the size of a common head to a pepper-caster, perforated with holes, only so small as to prevent a young bee from getting out. I then gradually withdrew the tin slide, which gave the bees

a clear way in a moment, still leaving them the way of egress and ingress as before; but after a week spent in their new apartment, I shortened the way to the storehouse, by closing the opening in block (D), and taking out the slip of wood in the opening of block (C). I preferred to give my storing bees the advantage of the shorter space to traverse, rather than those employed in feeding the young.

The hive has been two years in this position: it has shown no disposition to swarm, and, although very full of drones before the withdrawal of the slide, in a fortnight after I counted one hundred and seventy-five slaughtered within four feet of the hive. How many more must have been destroyed, I cannot guess; for in watching the bees at slaughtering time, you may see them carry the dead drones many yards before they let their burden go. (See the history of the drone, at page 36, et seq.) Such is a plain statement of facts: the fall of this year (1834) must prove results.

I had almost forgotten to mention that, by this method, no bees need be destroyed; for, when the honey is to be taken, push in the slide, and open both the door-ways of blocks (C) and (D), at a late part of the day. If the bees pass from the right to the left opening, you may make sure the queen is in the left, and contrariwise. The practice is to leave your first colony untouched; therefore, if the bees retreat to that hive, your way is plain. Late in the evening of the second day,

close the two openings, to prevent any bees annoying you; then, with a fine soft wire separate the hive for store-room from the bottom, by passing the wire under it; this being done, slip a tin under the hive, and lift hive and tin together away from the place about three or four yards: protect it from the weather through the night and following day, until an hour before dusk, when you may safely release the few prisoners you have made in the hive by removing the cloth, and they will at once pass over to their mother and monarch. I need hardly add, at dusk take your treasure in doors, and run it off. The hive is then returned to its place, for further stores, and no suffocation is necessary.

This plan has its inconveniencies: straw hives will wear out,—they are also made the receptacle for the eggs of different sorts of insects—they much favour the moth—are liable to contract a filthy smell by long use, and imbibe in damp weather much unnecessary moisture. To obviate these inconveniencies, we strongly recommend square boxes, of inch stuff, well dove-tailed and screwed together, and afterwards painted.

In the ventilator at the top of the second hive, I have placed a bung, and occasionally withdrawn it, to break the propolis by which the bees fill up every interstice. This should be attended to once a week. I have also found an inconvenience arising from *too great* ventilation in unfavourable weather, in consequence of the size of the second under

apartment, and its distance from the *heat* of the parent stock, being unable materially to raise the temperature, as is very often needful, in continued rains and chilly weather.

I have thus fairly presented to my readers the result of my own experiments on Mr. Nutt's valuable hive; and I have the pleasure to add, his good feeling to the industrious poor of this country is such, that he is trying the working of this plan in his own apiary, to improve upon it, for those who have the strong prejudice in favour of straw hives. I intend to try one or two more plans for cottagers, and hope my readers will be so numerous that I shall hardly have time to prove my work before they call for my specification.

My next chapter is addressed to the ladies of Britain.

CHAPTER XIII.

THE LADIES' SAFETY HIVE EXAMINED AND EXPLAINED.

"Let not my love disdain these truths to hear,
Which please alike the learned and the fair:
For though no tender tale her heart engage,
Nor song of love-sick swain bedeck my page,
My humble prose shall teach her how to find
Mellifluous sweets which leave no ills behind.
Not all the suitor's vows his *heart* declare,
For *plighted* troth is sometimes lost in air;
But these pursuits will honeyed fragrance bring
Without the danger of the treacherous sting."

Some curiosity may be excited by the name I have given my newly invented hive, and the motto by which this chapter is headed. They may seem curious at first sight; but, when my readers have travelled on with me a little further, I hope we shall be familiar, and they will not charge this act upon me as evincing egotism.

Having the happiness of dividing the joys and sorrows of life with one in whom, in the words of Solomon, "the heart of her husband doth safely

trust," for "she looketh well to the ways of her household, and eateth not the bread of idleness," I felt it was my pleasure to save her as much annoyance as possible while pursuing her daily avocations.

Bees claimed a great share of my individual attention; but the constant fear of being stung, or not managing the bees correctly, so strongly influenced my partner, that she confessed her fear, and begged to decline the duty; unless something could be done to find bees without stings, or hives that could be so worked as to take away fear in management.

Another circumstance suggested to me the idea of making a hive, which, in bad seasons, or in second-rate situations, might be made available to the wants of the bees, without overpowering their energies with *too much* room. At Shepherd's Bush, where I reside, the season for collecting honey is very short. The village is principally surrounded by cow-pastures, which are cut very early for hay, that the cows may get the earliest advantage of the grass: it therefore became necessary for me to adopt some plan by which I might give my little labourers a small portion of room for the supply of their immediate wants, and have the means of increasing according to circumstances.

Such were the inducements to thought—the following pages will give the result: and I trust my fair countrywomen will do me the justice to say, if they do not approve the hive and put the plan into operation themselves, that, at least, I

have done what I could to smooth some of the hindrances to this study, under the best feeling of a married life—a persevering endeavour to please my wife. Entreating candid thought, I shall proceed with my work, and beg my fair countrywomen to turn back to page 9, in which a pledge is recorded, and an invitation given.

Ladies generally consider keeping bees a task of imminent risk, and that those who are successful in the pursuit are either naturally impervious to the sting, or possess such deep science in the matter that nothing less than the business of a life can insure excellence; or, although unconfessed, that necromancy or legerdemain has *something* to do with it. Now the real secret is a successful application of common sense to common principles, and a general acquaintance with the habits, instincts, and peculiarities of the bee.

Courage is not half so necessary as judgment: an old proverb has it,—

> "He that fights and runs away
> Shall live to fight another day."

So it is with your bees: if you find, on approaching your hive on a windy day, that the bees have as much as they can well do, safely to reach home, get out of their way; or the first young fellow, who is driven against you by the wind, will make haste into the hive, and quickly give the pass-touch of war, when you may expect a regular attack: common sense says, Do not go near the hive on windy

days. Again, bees dislike shaking: for you will find on the least vibration of a hive, a number come to the door in a great hurry to see what is the matter. If the vibration be caused by opening the windows —or cutting off a glass of honey—or removing filth —or feeding, all of which are indispensably necessary, and thus cause a commotion, cease for a short time:—you may be apparently a coward, but really a conqueror. Again, remember that *entire* separation from the queen is one of the most certain means of attaining an ascendancy over the bees, and easy recognition of their queen, the most powerful excitement to keep them in constant activity: this instinct will be found very valuable in your future management of the hives.

An extraordinary instance of attachment to the queen occurred to me in stocking one of my hives. —In the very height of the season, just before a hive swarmed, I purchased a stock at a distance from my residence; it was in one of the imperfect, flat-shaped cottage hives, such as is used for working the top glass, seen at p. 61. By means of the bottom box and cloth, recommended at pages 53 and 54, I removed it to my own house without the least personal inconvenience; and late in the evening gave the bees full liberty of air through the night, and a clear egress and ingress at day-light, by untying the cloth and throwing it loosely around: they were in the most deplorable heat in consequence of the removal and their near approach to swarming.

On the following night I intended to have removed the hive off the box to place it on a flat board, preparatory to fumigation: but on attempting the removal, to my almost inexpressible pain and anxiety, although the combs had been kept in their places by the under box while travelling many miles; yet, when lifted from that support, nearly the whole of the combs, bees, and queen fell out together in one mass. I confess I was horror-struck at the sight. The moon was just rising *full*, which, while it gave me light, exposed my person to the attacks of ten thousand infuriated bees. The principle of running away was then useless; the best use of my wits alone got me out of the difficulty. With the teeming thousands before me I employed two hives: the one in which the top part of the combs and multitudes of bees remained after the mass had fallen out, the other a new empty hive; the doorways of which I brought very close together. As I could not get the whole of the comb under the original hive, I placed as much as I could there, and the residue under the new hive, by breaking the combs in half, and placing them on their edge, side by side, within the diameter of the hive, and then covering them with the hives. I expected the bees would have used the two indiscriminately, until I could venture to separate them for my experiment. Then came the fear, "What if the queen should be hurt?" The next day, I watched most narrowly and found that the queen

was safe, because the bees were repairing the damages of the removal—but as evidently hard at work carrying the honey from the new hive to their own. The queen being safe, and the bees having left the brood comb where I had hoped to have established a *second* colony under a new made queen, (see page 16,) I at once determined to fumigate them, and place the neglected brood comb in my new ladies' hive, in order to save all the valuable brood, which another day would have destroyed, and establish the queen on a new throne.

The fumigator was put to work in the afternoon of the following day; and very soon I had command over all the inhabitants. The puff balls were not very good, which caused me to be longer than usual; so that many of the bees began to get lively again. But before this occurred I had lifted the second hive, under which there was not one bee; and, having adjusted the combs in the ladies' hive, I proceeded to store away the bees, by placing them in the *side apartments;* but, to my mortification, after having almost individually examined the whole for the purpose of restoring the queen to her subjects, I could not discover her. I thought I might perhaps have put her into possession amongst some of the comb; but, to be certain, I gathered up every bee I could find, and put the emptied hives on their side against mine, so that the queen might have every opportunity to get in, if not already there. The profusion of spilt honey, the hot weather, and the

bees from my other hives, caused a great commotion, so that the real cause, the absence of the queen, was undiscovered. The next day the same hurly-burly continued; when, having *feared* my queen was unseated, I took an apiarian friend to form a judgment. He gave the opinion that there surely was a queen in my new hive, or if destroyed, one soon would be made out of the brood comb. I pointed to groups of bees on the grass and around the stand, still fearing that my queen was in one of them; but he so positively said such was not the fact, that I did not examine any of the masses then. Naturally inquisitive, under such circumstances, I visited my perturbed hive late in the evening, and found, while the others were quiet, this was in an uncomfortable state. All the masses or companies of bees, which had been licking up the dropping sweets through the day, had now all retired, save only one lot about as large and as round as a small cricket-ball. My heart beat high with a sensation which the enthusiast in a pursuit alone can comprehend. I hoped all would yet be right, and left them. At dark I again visited them—hope revived, for the mass remained unmoved: by the earliest peep of day I rose from bed, after a sleepless night, to look for my beauty, and, if successful, witness genuine loyalty.

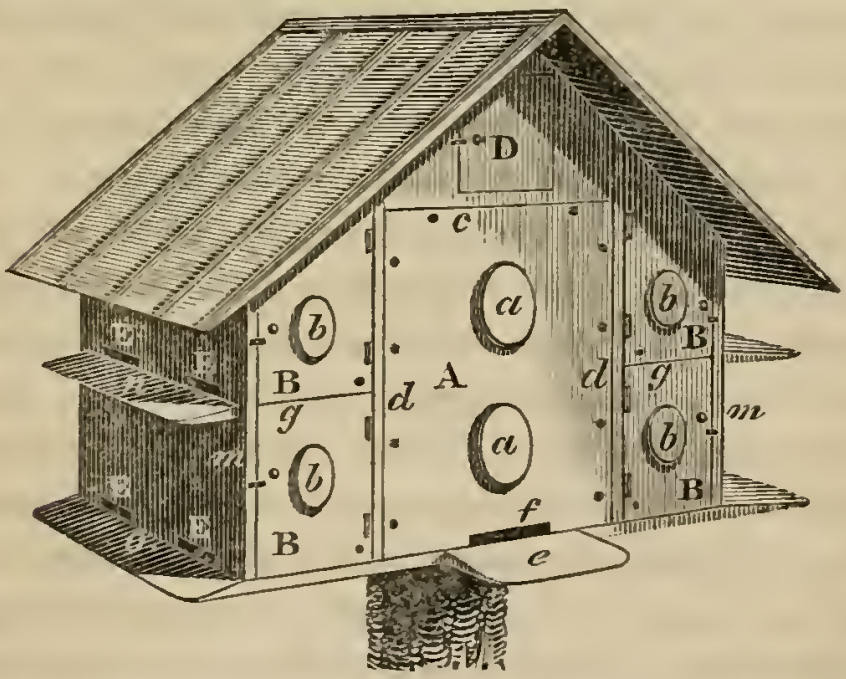
I confess myself an enthusiast: I laid myself at full length on the grass, and with my hand gently opened the benumbed, but still clustering mass:

there was the queen, surrounded by her faithful and watchful subjects, paralyzed, and to all appearance quite dead. I picked her up, placed her in my hands, breathed upon and cherished her for a considerable time, until, I think with joy of a new kind, I saw her move one joint of one leg: my tender care was renewed until the sun had mounted high in the heavens, and by his beams renewed the perturbation of the defenceless hive. The demonstrations of misery were renewed ten-fold when any one approached the hive; and then, indeed, courage was necessary, for the bees had just missed their queen. To those alone who have witnessed such commotion can an idea be conveyed.

Now came the delightful scene—my queen was restored by the genial warmth of my hand, and walked comfortably about it; the bees, her subjects, were whirling in incensed crowds around the hive: the buzz of discontent was incessant and clearly marked. At this moment I called all who were in the house to witness the scene. I placed the queen on the alighting-board at the door of the hive: she was recognized in a moment; the pass-touch, or pass-word, or pass-hum, was communicated. The great commotion was instantly changed to peace. She was caressed—licked over and fondled—the bees pressing round, who, with an affection worthy of the best subjects of a beloved monarch, shewed their attachment in terms that even human tongues could not exceed.

From that instant all was peace, and harmony, and joyful labour. Very few of the brood were destroyed by the accident which gave rise to the development of this peculiar instinct; and, I hope, I treasure up the remembrance of the circumstance, as one more proof of the truth of that passage of Scripture, "God doeth great things and unsearchable; marvellous things without number."

Gentlemen must be pleased to remember, that, while I consider my practice so easy, as to be safely placed in the hands of the fair sex; it is equally adapted to their use, being based on the sound principles of *cool* store-room—easy ventilation—easy deprivation of honey—and similarity to the *simplest* modes of bee-management.



On examining the above drawing, the first thing that presents itself to notice is the protection to the

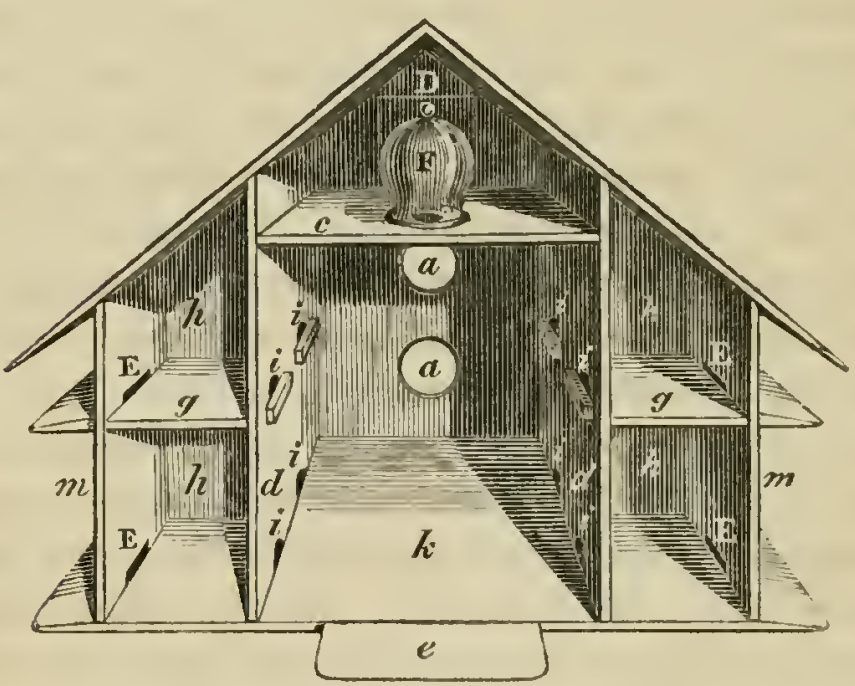
inmates either from slowly falling rain, or beating showers, as well as a safe shelter from gradually melting snow. This, and the one which shews the interior of the hive, are both drawn to the same scale, of 1 to 11, and the letters refer to both the cuts, although the parts are viewed differently.

To the carpenter I need hardly say, choose the best yellow deal you can find; and shoot the edges as straight as possible. All the internal divisions, and the sides and ends, are made of inch stuff—the roof is three-quarters, and the doors $\frac{1}{2}$-inch—the bottom is three-quarter stuff. The front measures 22 inches across the front, outside measure: 15 inches from front to back: from the peak of the roof to the alighting board 21 inches. The roof projects 2 inches over the front and back, and is 19 inches along the ridge. The span from point to point is 2 feet 3 inches, and the boundary line of the centre, marked *d*, is 13 inches high, and the outer line *m*, measuring from the *inside* of the roof to the *upper side* of the floor, is 11 inches high. The diameter of the centre windows is $3\frac{1}{4}$ inches, and that of the side apartment $2\frac{1}{4}$ inches.

The hive consists of a centre space, with two windows, *a*, with two corresponding at the back, to all of which shutters push in like a pot-lid. They are worked *rather* oval; or more properly speaking, not correctly circular: so that, by means of a long-shaped handle, the window-shutter may be twisted tightly into its place. The space designated by the

lines *c d d* and bounded by the floor, is that part which, when once peopled, is not again to be disturbed; *f* marks the public door-way, and *e* the alighting-board, which should slope outwards; that is, in technical language, "be champered off to nothing." The square, marked A and bounded by *c d d* and the floor, unscrews to stock the hive, as directed at p. 221. On the top of this centre, a board *c*, is placed, which makes a space like a low attic. The size is seen by the shape of the front marked C, and is entered front or back by doorways D. In the floor of the attic two good-sized holes are cut, (see the other drawing,) for working glasses, to be stopped by corks in the winter, or after the removal of the glasses. On both sides of the centre are four separate apartments, B; of which *d* marks the inner and *m* the outer partition. They are totally unconnected with each other; but all have a doorway to the parent's grand apartment, and are divided from each other by the floor *g*, with the smaller windows *b*, mentioned before, $2\frac{1}{4}$ inches in diameter, with shutters. Each of these side apartments, until required for use, (see p. 222, *et seq.*) cut off from the queen's apartment by a tin slide, and from the open air by a moveable slip of wood, (see p. 224,) placed in the doorways E. An alighting-board, *n*, runs the whole length of the hive, and is to be just so wide as to fall within the droppings of the roof; the ledge *o* for the under apartments must be no wider. The hives made by

my carpenter are put together in the most substantial manner possible: all the edges are tongued in cement, and *screwed* together with 2-inch screws, of which no less than 148 are used in each hive. The painter puts on three coats of oil colour and one of varnish, besides well stopping the whole. The advantages of bee-management depend entirely upon a regular temperature, which cannot be managed in hives made from bad and *shaky* wood.



This diagram represents the hive with all its front taken away to expose the interior, viewed in the most favourable point to show the whole, without violating the rules of true perspective. While describing the outside, I adverted to the floor of the attic, *c*, which is perforated with holes for *two* glasses,

F, but as they stand immediately behind each other, one only can be seen. The alighting board is known by *e*; *k* represents the floor of the queen's apartment; *a a* the inside of the two back windows; *h* the division between the side apartments; E the unopened doorways; *m* the outside line; *d* the inner partition; and *g* the floor of the upper side apartments, and is of course a ceiling to the under ones: D represents the inside of the opposite door into the attic. It now only remains to show that the holes marked on the inside by *i*, are the openings through which the bees enter the side apartments at the proper points in practice, when you withdraw the dividing slides that prevented the passage to these rooms.

Such is a dry description of making this hive, and its various parts: it now falls to my duty to lead my friends to its practice.

To stock by a swarm, unscrew the front piece of board, where the screws are left exposed, and marked A in the first diagram, which opens the interior to your view. Place the swarm therein, like a common hive,—close the front, by the piece of board just unscrewed, until the evening, when the remaining screws may also be turned in, and your swarm go to work as fast as they please. Bear in mind, corks must be in the two top holes in the attic, and all the dividing slides closed in this first stage. With these precautions, you have a hive, in its simplest form, with one door.

If you intend to stock by means of two or three casts, as directed in Chapter X., or to put two stocks together to save time in the spring,—in fact, if you fumigate, let the front board, A, be unscrewed, and the hive placed on its own stand; then, when you have got your combs free from bees, regularly place them in the hive, the same way upwards as in that which you have just emptied. *Mind all the slides are fast, and the corks in the top.* During the process of fumigation, you will have to dispose of a great many intoxicated bees before you have found the queen; let them be placed in the side boxes during the examination, if you feel persuaded she is not amongst them. Put as many as you can into each, but take care not to open the doors after once closing, for the effects of the narcotic will soon go off. I will now suppose you have safely placed the comb in the hive, and re-screwed the front board to its place, and placed the handsomest queen in the hive; then close the principal entrance over the alighting board, and with your small hook, through the small gimlet hole in the doors, pull open all the slides which confine the bees; they will immediately go to the queen, and be as good friends under one queen, as though originally only one stock. Remember the instructions to capture all the queens; *and one only is to be put into the hive before you let the bees into the centre.* I repeat, ONE ONLY.

Having easy means of viewing the interior, you

may see that all is well, if the bees are busy inside, and quiet outside. Then destroy your captives, or use them for other purposes, which *experimental* apiarians have suggested; but which I will not run my practical readers into discouraging attempts by enumerating: or, save the supernumerary queens until three days have elapsed, when, should your hive be in a state of queenless commotion, open one of the side rooms and put in one of the queens, and then withdraw the slide: if there should be one already in the hive she will instantly slaughter her rival, but if not, the bees will receive their new sovereign with evident signs of delight.

I will not suppose any of my fair readers would fail to accomplish this first task; but if they should fear it, they will see by my advertisement, that I sell my hives ready stocked.

In the course of the season, if favourable, many indications of over heat, and want of room, will be apparent, the same as those laid down in the chapter on swarming; then let my fair reader and fellow student withdraw one of the slides, by means of the small hook, without opening the outer door. The little window in each room will enable you to see if the works are proceeding: if they are, wait until the storing room is nearly full; then open a second, and so on, if your season and your situation are good. If you wish to send your hives a distance, withdraw every slide at once, but do not open the outside doors, and close the front door until the hive has

been reseated; then direct the front door to be opened, and for the sake of easy ventilation as well as to prevent swarming, one also of the doors of the upper tier of side apartments farthest from the principal entrance. The glasses may be changed as often as needful while the season lasts; indeed, these hives appear to me to be capable of every bee manœuvre, except the introduction of the thermometer, and that is such an annoyance, especially as the bees will stop up the tubes into which the thermometer is to be placed, that I have got rid of the necessity of that expensive article.

These hives, when once stocked, never require renewing; the centre is always to be left untouched, for the side boxes and upper story alone are to be deprived of the honey deposited there.

I now request my reader to turn to the vignette, in which may be seen a number of ladies taking honey. The deprivation may be performed at any time, when the boxes are full. If it be determined to take honey on any particular day, an arduous duty in most hives, little or no care is required in this. The day before you intend to have a share of the honey, with a stiff wire close the slide of your honey box: this manœuvre will make many bees captives, and cut off their retreat to the queen, and of course they cannot get out through the closed door. What is to be done in such a case? Use the wonderful instinct of the bees to effect your purpose; open the little outward door of the room, about one

hour *before* dusk, and all your prisoners will rush round to the front of the hive to the queen, with an alacrity that is amazing. *After* dusk, close the outward door again, and you may take your friends to your hive on the following day, to see you deprive it of its honey without any fear of molestation. When you have taken out the combs shut the door, and withdraw the slide for the bees to clean out the room: if they have space enough without it, cut them off again after cleaning, or leave them to themselves. Judgment is necessary.

I now propose, in a concise manner, to shew the conveniences and inconveniences of other hives, and their remedy, or rejection, or adaptation in this.

Cottage System.

One of the principal advantages, its advocates contend, is swarming; for by it there is a greater likelihood of gaining the greatest quantity of pure honey: and although they admit time is lost by clustering out, and the indiscriminate mixture in the combs, yet, after all, they like the trouble of a first swarm, if they could prevent the clustering, and unnecessary casts.

The disadvantages are numerous: see p. 57, 58.

In my hive, by opening a way to a side box before swarming, that natural effort to reduce the population to the size of the city may be prevented entirely; or by allowing the slides to remain in, if new hives want stocking, swarming may be promoted; and after the first swarm all the useless

casts and colts may be as easily prevented. I need hardly repeat that ventilation and increased room is the secret which prevents the swarm. Again, in the side boxes all the honey is pure, being cool: the hot centre I leave to the management of the bees themselves; and lastly, while the bees in the cottage hive cannot easily be fed, without exposure to cold, and frequently to the destruction of a colony, I can give as much as I please, without once exposing them to the outward cold, by opening a way to the side honey boxes, where I deposit some food in a small saucer, with a float; or, by partially opening the slide, equalize the heat in the side box, and then let the bees in: by this plan no perceptible decrease would be experienced in the temperature.

Storifying System.

To this system numerous objections have been raised, especially the indiscriminate mixture of honey, eggs, and bee bread, which is totally prevented by the use of the Ladies' Hive; while the simplest forms of it are introduced with very great perfection. Take for instance, the use of the glasses: in this hive you have a protected top, with two holes directly over the very seat of empire, for the use of two glasses, which may be renewed as often as you wish:—or if an *eke* be liked, what is an eke in this hive but the withdrawal of a slide? Again, those who prefer *nadir* hiving, can have their fancy met by employing the bottom side boxes only:

those who hold only with *super* hiving can use the glasses, or top boxes. To the inventor of three hives, p. 66, preposterously placed one over the other, I have nothing to say, except that, although I promise as much room, I have not three stories over each other. All the advantages enumerated at page 69 I take up, although I accomplish the sixth by the exact reverse: the last advantage I improve upon; while all the difficulties and disappointments of dividers and subdividers, persons to assist, and impure honey, are all prevented by my hive, which will enable the operator to proceed with as much confidence as though the whole hive were laid open to his view.

But when we come to view the storifying system, as exposed to examination in Chap. V., the advantages of not disturbing the breeding apartment must be manifest. In one point of view it is seen particularly; by the storifying hives, the bees are made to traverse a much greater space *on foot* than they ought; by my hive, even if a side door is not opened to give the bees a short cut into the honey boxes, yet they have a shorter distance to travel than when first filling the hive. Again, consider the invasion to which hives are subject, and how peculiarly good the wood must be to warp so little, that when two boxes are placed upon each other, their weight shall so effectually close them that no insects can get in at the edges; in my hive, every joint is tongued in cement, and fastened with 148 long *screws*.

What is the advantage of making artificial swarms,

by taking a centre box and risking the destruction of the two others? when by my plan, you may have every advantage, and avoid every inconvenience, and get swarms when you please, provided the bees are in a *fit* and *safe* state for such an effort, and *not without:* it is impossible to blunder in this case.

Collateral Bee Boxes.

Then follow the collateral boxes in Chapter VI., which are only another modification of the storifying principle; all the risks attendant upon the taking of the honey, or the annoyance of an impure product, are equally certain in this system as in that just examined, and yet whatever advantage they claim may be found in the Ladies' Hive. In Madame Vicat's hive, with its huge apparatus, nothing new is elicited, except an easier mode of feeding, and the certainty of having the whole hive kept compactly together. I take both advantages.

Mr. Huish's Hive.

Next follows Mr. Huish's hive. I differ from him as to the proper materials to be used in its construction. This is a secondary matter. To take his produce he must submit to have on a bee-dress, while the ladies who use my hive need not put on an extra covering. The négligé dress for a trip on the lawn, is amply sufficient for all the purposes of bee-management. Mr. H. cannot prevent swarming, nor can *he ensure* that his bees will work in such a manner as even to allow him to follow his own plan. Sometimes they work across from comb to comb,

and thus totally prevent deprivation. With me, they cannot make their combs awkwardly for my store-houses, for, work as they will, the store-room is emptied with equal facility.

I leave my readers to draw a comparison between mine and that invented by Mr. Nutt. We are both candidates for public favour, and as such, let us both stand on our own merits. Mr. N. has many, and I hope I have some. I have heard an objection to the use of the thermometer, which with many people is not well understood, and requires constant attention: to obviate such an inconvenience, I work my hive without any thermometer, trusting to the usual indications of over-heat to regulate my movements.

Such, my readers, is a history of my favourite hive, and its peculiar features when compared with others. To say more, would only confirm the opinion I have already formed of myself while writing, that I have praised myself as much as I dare.

The hive may be seen at my father's, No. 6, Vere Street, Oxford Street; or at Messrs. R. R. Chubb & Co's, Seedsmen, No. 70 & 71, Newgate Street.

I keep a seasoned supply, ready-made and painted, and charge three guineas each for them: and if ordered, will purchase a first swarm, or stock, and put it into the hive for one guinea extra; or on payment of coach-hire, with comfortable accommodation, so as not to interfere with my business as a printer, go a short distance into the country, with my fumigating apparatus, to settle a new colony.

CHAPTER XIV.

GENERAL DIRECTIONS FOR THE EXTRACTION OF HONEY AND WAX.

I HAVE found Mr. Keys' direction, respecting the matter of this chapter, so very satisfactory, that I hesitate not to give an abridgment of his very copious and valuable instructions. Whether impure combs from the cottage system, or the white pure combs from the ventilating hives, are in the hands of the apiarian, he can act according to the rules following.

The directions how to make mead I leave for country practice, and refer those who are in ignorance on the subject to most of the receipt and cookery-books published during the last century.

" The combs should be taken out of the hives as soon as possible, and the honey drained from them while yet warm, as it will then run more freely. To further this intention, the hives should be brought into a warm room, if the air be cool, but where no bees can enter: for otherwise the smell of the honey will attract multitudes to their destruction and likewise greatly interrupt the operation.

The combs are to be loosened from the sides of

the hive, by being cut through at their edges by a long, thin knife.

If there be any bees upon the combs, when taken out, they should be brushed, or rather blown off, and if besmeared with honey, washed in two or three waters made a little warm; being then laid on a sieve, and placed in the sun-shine, or before a fire, they will revive again, and fly to their respective homes, if they have not been subjected to the sulphur.

Those parts of the combs that are empty should be cut off first, and those that are black and drossy laid by themselves; as must also those that have farina; but if any have brood, great care should be taken not to crush them, as they may assist a stock that wants strengthening.

Then those parts of the combs that contain virgin honey are to be cut out, and drained by themselves; for there are scarcely any hives but what have some portion of virgin combs in them.

Great care must be taken that no maggots, or the juice of them, or any of the farina, be squeezed out among the honey, for both communicate a bad flavour and quality to it; therefore a little honey had better be lost; or those parts which cannot be separated without foulness, be returned again for the bees to feed on; by which, in the end, no loss will be sustained.

It is usual to lay the combs on sieves for the honey to drain through; but the honey is too long

in passing through them, and thereby the most volatile and fragrant parts are exhaled.

A better apparatus is a frame of wires adapted to the size of your pans, each wire about one inch distant from another; through these the honey will separate much sooner. Lay the combs thereon, cut through the cells about the middle and turn them; in three or four hours the honey will be run out; then cutting through the upper parts as they lie, turn them also downwards and the whole will be soon finished. Large *tin* dripping-pans are to be preferred for this purpose, as iron pans have generally some rust on them, and earthenware absorbs or sucks in a great deal of the honey, which *tin* does not.

As several small portions of the combs will fall between the wires along with the honey, a bag must be provided of a conical form, that is, wide at top, and tapering to a point at bottom; it is to be made of fine flannel, or such canvas or cloth as the dairy people strain their milk through. This is to be hung between two chairs, or to the ceiling, and a jar, or other proper vessel, set underneath to receive the honey as it runs through. The honey is to be poured out of the draining pans into these bags, whereby it will be entirely freed from every particle of wax, much more so than if passed through hair sieves in the common way. Care must be taken that the bags be not hung so near the fire as to melt the wax, for that will spoil both; but a mode-

rate degree of heat will greatly forward the operation; and the honey will be the better the less time it is exposed to the dust and the air.

In large apiaries, where perhaps fifty or a hundred stocks are taken up at once, the press is by some used, without any previous drainings; which in the common way would be a very tedious process, for such quantities. With submission, however, I should imagine, that if a number of large tin pans, with sticks only laid across them, were used, the superior goodness of the honey would amply repay the first cost of the pans; and the process would be accomplished in a very moderate time. By the press all the honey is made alike impure; which gives too much room for the odious character of sophistication, though perhaps the accusation of a want of neatness might be more applicable. If equal delicacy were observed in the extraction of honey as in the management of the dairy, it would fully pay for the trouble, and perhaps introduce honey once more to general acceptance.

The first running from virgin combs only should be reserved by itself, as being of the first quality; provided customers can be found to give a proportionable price. The next in value is that which drains from the other combs indiscriminately; and a third sort is produced from the combs when squeezed or pressed through the bags. This sort will be foul, and fit only for cattle, or some external use.

But where mead is made, it will hardly be worth while to press the combs; as they may be thrown into water for that purpose directly; or the combs, after pressing, may be placed, a few at a time, in the apiary, in *dry* pans, and the bees will take care that not a particle of the honey shall be lost.

The pots or vessels of honey should remain a few days to settle before they are closely covered for sale; for if they contain any small particles of wax, these will rise to the top, and are to be skimmed off. The good combs are to be kept apart from the bad; as they are intended to be melted separately.

The usual method of separating the wax from the drossy part of the combs is to *boil* them in a proportionably large quantity of water; which is to be frequently stirred to prevent the wax from burning. When it has boiled sufficiently to have thoroughly melted the combs, it is to be put into *hair* bags, such as bottoms of sieves are made of, and then pressed by some convenient instrument so long as any wax passes through: the drossy part that remains may be re-boiled in fresh water, and re-pressed, whereby more wax will be obtained.

A vessel of cold water is to be so placed as to receive the wax as it comes from the press or bag, to cool the wax the sooner, and to prevent its sticking. The wax is then to be melted a second time, and pressed through bags made of cream cloths; after which it is to be melted a third time, and passed through bags made of still finer cloth. Lastly,

it is to be melted again, without any water, and poured into pans wider at top than at bottom, so that the wax, when cold, may be turned out without difficulty; and not only so, but the smaller the bottom of the cake is, the dross will be more collected, and consequently the less waste made in scraping it off.

When the wax is in the mould, if there be any froth, blow it on one side and skim it off. The moulds or vessels it is poured into should be first wetted with cold water, to prevent the cakes from sticking to them. The moulds are to be kept in a warm room until cold, otherwise the cakes of wax will crack in the middle. If they happen to stick in turning out, warming the vessels a little will loosen them so as to come out with ease.

A greater quantity of wax will be procured if the virgin and other yellow combs that have no farina or brood in them, be melted by themselves; for the fewer impurities there be, the sooner the wax will run from it; whereas if entangled with a large quantity of dross, the press having less power over it, the more difficult and tedious the separation will be. Upon the whole, whatever of these methods be taken, it is a very troublesome business, consumes much firing, a quantity of wax is wasted in the operation, and the drossy matter, which is thrown away, contains a considerable portion of wax.

Many and great were my endeavours to obviate these difficulties, which have puzzled me ever since I

kept bees; at last I hit upon the following processes, which I give to the public as the most perfect that have hitherto come to my knowledge. But it will be necessary, by way of introduction, to make some discriminating observations on *combs*. If we carefully separate the hard dark-coloured or black cells from each other, either full or empty, they will uniformly be found to consist of a film or very fine skin, instead of a *partition of wax*. For Supreme Wisdom has endued the bees with such economic sagacity, that as soon as a maggot has quitted its skin, they cement or hang it up against the waxen sides of the cell; and very likely several of them successively, until they become sufficiently strong to form a partition of themselves: the wax is then *taken away* and applied either to form a new or to cover other cells; for the bees, in many instances, are found to be extremely saving of their wax.

But in order the more certainly to ascertain this opinion, I boiled some of these combs, which were entirely empty, but not the least trace of any wax was found. The experiment was repeated with the same kind of combs filled with farina, and the result was exactly similar. To corroborate this fact still more, if several of these skins or films be twisted together, and lighted, they will burn like a candle, as many other substances of this kind will do, though not containing the least particle of wax; whereas, if we press together several of the finest virgin cells, and hold them to a candle, they will

melt but not flame. To which we may add, that these skin partitions do not manifest any waxen property, either to the eye or the touch: much less has farina any such quality when tried by fire. From hence it may be concluded, that we may as well attempt to extract wax from a pasteboard, as from such kind of combs. Therefore, that so very large a quantity of drossy matter may not prevent a more perfect purification of real waxen combs, they should be previously separated by the hand, and thrown on the fire, to make the pot boil, as the best use they can be put to; which will much shorten both the trouble, time, and the expence of fuel usually bestowed upon this useless rubbish. People therefore need no longer wonder that the combs from old stock hives yield little or no wax; for if any be obtained, it is what covered the honey cells.

For extracting Marketable Wax without pressing.

Take a tin cullender, all the holes of which are *round;* the handles must also be off, instead of which fix across it a strong wire or iron bail, or a tin one, like those of watering-pots; and if soldered on the inside, it will be most convenient. The cullender in size must be adapted to that of the pot or kettle you intend to use; but to go withinside of it, as close to the sides as possible. Set the pot on the fire, with about three or four inches depth of water therein, in which is to be mixed single *aqua-*

fortis, in the proportion of half an ounce for each quart of water. In this put as many wax combs as will conveniently boil when melted. As soon as they begin to melt, they should be frequently stirred, until all be thoroughly melted; let it then boil without stirring, that the wax may rise clear. It should be made to boil very briskly, during the whole process. As soon as the yellow froth rises, put in the cullender or sieve, and press it down in the liquor, until it be about half full; but great care must be taken that none of the liquor rise over the edge of the cullender, as that will foul what is therein, and spoil the operation. With a wooden, or what is better, a tin ladle, first dipped in cold water, lightly skim off the wax as it rises upon the surface, and put it into a narrow-bottomed pan (previously rinsed in cold water) set as near as can be to the pot on the fire, and continue skimming the wax off as long as any rises, depressing the cullender in proportion as the liquor sinks.

Instead of a cullender a hair sieve may be substituted; but where a person keeps six or eight stocks of bees, it will be most profitable and convenient to have a tin vessel made on purpose to fit a due proportioned kettle or pot, the sides of which should be quite straight, so that when the *tin separater* slides down, there may be no vacancy for the farina to rise up between. The holes in this tin separater should be as numerous and small as possible in the bottom, and about two inches up the sides; the bot-

tom should be quite flat, without a rim, like that of a tin quart pot, that it may press the dregs the closer down, when near the bottom.

When the liquor in the pan is nearly cold, the wax is to be taken out, and what dross adheres to it scraped off. The wax is then to be re-boiled in a small quantity of water, and about a fourth part as much aqua-fortis as before to a quart; as soon as it boils take it off, and let it stand until cold. The wax will concrete at top, and the remaining dross being again scraped off, may be further purified with other combs.

This process will not only extract the wax more completely than any of the methods generally used, but it is also much less troublesome, and in every other respect more eligible; for the aqua-fortis may be got for a penny an ounce, consequently that trifling charge is much over-balanced by the other superior advantages. As aqua-fortis procured from different places may not always be of equal strength, a consequent variation will be found in the process. The operator must therefore add or subtract in conformity. Some practice is necessary to form a judgment, or to conduct this or any other operation skilfully. Double aqua-fortis will not answer the purpose, either in this or any of the following processes, nearly so well as the single, and the wax produced will be of a pale, dingy colour.

A less expensive method, though not so eligible, is to put the combs loosely into a canvass, or rather

a fine hair bag, tied up close at the end, and put into a kettle with a due proportion of aqua-fortis and water; a leaden or iron weight is to be laid on the bag to keep it down to the bottom. It must be made to boil so as to throw up the froth briskly, which is to be taken off as before described: a thick board with a handle in the middle is then to be put in, to press out what wax may be still adhering. It is afterwards to be treated as before described. It should be carefully observed that in these processes of skimming off the froth, what rises of a clear yellow should be reserved by itself, as often requiring no further purification. The more forcible the froth is thrown up, the purer it will be, and the operation the sooner finished: by this bag-method, full as much wax, if not more, may be obtained, as by any of the usual modes.

To extract Marketable Wax from the combs by a single operation, without either straining or pressing.

Take an earthen vessel, much narrower at the bottom than at the top; put therein a quart of water, and one ounce of single *aqua-fortis*, or the like proportion for larger or lesser quantities: stir them well together, and then put in as many good wax combs as, when melted, will reach within a finger's length of the top of the pan; set it on a clear but strong fire, and as soon as it begins to melt, stir it about, and so continue until it boils,

and even longer, if the combs be not all thoroughly melted; remove it then from the fire, and let it stand until it be cold.

The wax will be in a cake at the top, and the impurities underneath it: there will be two sorts of impurities; the lowest will be almost entirely like dross; this is to be taken off by itself, and is of no value; the next will be a layer of dross, but with some wax intermixed; this also is to be taken off, so as to leave the cake pure and reserved by itself; as also any foulness that may be on the top; both which may be refined along with more combs the next boiling.

Old combs that have wax in them, or other refuse that has been pressed, but yet retain a considerable portion of wax, may be thus treated, and will yield as fine yellow wax as the best combs; provided the combs or refuse have been previously pressed down, and kept in a close tub or vessel in a house for five weeks: which will occasion the *impurities* to ferment and rot, (the *wax* will *not*,) and thereby disengage the parts, and dispose them more aptly for separation.

To extract Wax from the Combs by a single operation, to a greater degree of purity, and without straining, pressing, or the use of a precipitate.

Take the same kind of vessel as is used in the preceding process, put into it about a quarter of a pint of water, to keep the wax from burning; then

put in so many entire *empty* virgin combs, or at least such as are of a good yellow, as the vessel will conveniently hold; set the pan over a brisk but clear fire; as soon as the combs begin to melt, keep it *stirring* until it boils; then *cease*, and a clear yellow froth will rise on the side or middle. This is to be skilfully taken off as fast as it rises, and put into a pan previously set close by. The fire must be so managed as to keep the froth rising up, but not so fierce as to make it boil over. If it rise too fast, remove the pan to a less hot part, or damp the fire a little. The combs, when first melted, should only be sufficient to rise within three inches of the top of the pan, to prevent the necessary rising froth from running over; when the froth rises a little foul, return it out of the ladle into the pan again, and draw the foul scum aside from the part where the froth rises, or the whole will be spoiled: when no more clear froth will rise, take the pan off, and turn the remainder out into a vessel of cold water. It may be afterwards further purified along with other combs, by the second process. A shallow tin ladle will be most convenient for this business; but for want of that a basting-ladle with the top taken off, will do very well.

The pan that has the purified wax is to remain near the fire undisturbed, and with a cloth over it, until it is cold; it will then turn out a cake of fine wax (if it has been managed judiciously), and free from dross.

This process may be very serviceable as preparatory to forming *white* wax, and for several other nice purposes, where great purity is required; and in fact is the readiest and cheapest method of extraction of any; but is restricted only to fine combs.

To render Wax miscible with Water.

In a quart of water dissolve one ounce of pearl or pot ash; add combs (as described in p. 240), and boil them until melted: the whole will then appear of a milky colour, the wax and water being incorporated, and when cold will resemble cream. To restore the wax re-boil it with three times the weight of aqua-fortis as there was of ashes; hereby the wax will be extricated from the water, and resume its usual state, only of a paler colour than common. I give this process as one that I happened on in the course of my experiments, not knowing but it might convey some useful *hint*, or prove of real service.

Doubtless some ingenious persons, who keep considerable apiaries, may add to the above improvements; which are but new to myself, and consequently not likely to be so perfect as time and experience may render them.

Combs should never be kept long before they are melted, for, though they be covered in a close box, the wax-moth will find a place to deposit its eggs in, and the young maggots will gain an entrance, to

the destruction of the combs; after which, turning to perfect moths, they will prove very hurtful to your apiary.

A hive of combs yields but a small portion of wax, compared with the quantity of honey. A hive of three pecks well filled, and of not more than two years' standing, may afford twenty-five pounds of honey, and not above two pounds of wax. Stocks, taken one with another, in the common way of management, do not upon an average afford above one pound of wax each."

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